



Precision Strike Winter Roundtable 2006

*Precision Requirements—New Policies
Creating Innovative Opportunities*

Crystal City, Virginia

January 25, 2006

PSA Winter Roundtable 2006 Agenda

SIX DECADES OF GUIDED WEAPONS:

Barry Watts—Senior Fellow, Center for Strategic & Budgetary Assessments

PRECISION STRIKE TO PRECISION EFFECTS:

Terry J. Pudas—Acting Director, Force Transformation, Office of the Secretary of Defense

OVERVIEW OF THE QUADRENNIAL DEFENSE REVIEW:

Colonel Pat Kelly, USA—Senior Army Advisor to the Secretary of Defense for Policy, QDR Integration Team

NATIONAL MILITARY STRATEGY OF THE UNITED STATES OF AMERICA:

Lieutenant Colonel Jay F. Rouse, USA—Strategy Planner, Strategy Division, J-5 Strategic Plans and Policy Directorate, The Joint Staff

CHAIRMAN'S PROCESS FOR INTEGRATING REQUIREMENTS & JOINT CAPABILITY AREAS DEVELOPMENT: **Vice Admiral Evan M. Chanik,**

USN—Director for Force Structure, Resources and Assessment (J-8), The Joint Staff

JOINT COMMAND AND CONTROL CRITICALITY TO PRECISION STRIKE:

Major General Charles N. Simpson, USAF—Director for Joint Requirements and Integration Directorate (J-8), U.S. Joint Forces Command - (*Presentation not approved for distribution*)

CONGRESSIONAL PANEL—PRIORITIES AND ISSUES:

INDUSTRY PERSPECTIVE: **John Douglass**—President, AIA

NEW S&T FUTURES FOR NAVY-MARINE CORPS—CRITICAL CAPABILITIES FOR 2020:

Dr. Michael B. Deitchman—Head, Air Warfare and Weapons Department, Office of Naval Research

UNMANNED AIRCRAFT SYSTEMS (UAS) ROADMAP—PRECISION STRIKE SUPPORT:

Chuck Riechers—Chief of Operations/Technical Advisor, OUSD (AT&L)/AS&C and OASD (NII)/C3 Policy, Programs, & Space Policy



Precision Strike Association—Winter Roundtable January 25, 2006

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OVERVIEW OF THE QUADRENNIAL DEFENSE REVIEW: **Colonel Pat Kelly, USA**—Senior Army Advisor to the Under Secretary of Defense for Policy, QDR Integration Team

Presentation available AFTER 6 February 2006

NATIONAL MILITARY STRATEGY OF THE UNITED STATES OF AMERICA:

Lieutenant Colonel Jay Rouse, USA—Strategy Division, J-5 Strategic Plans and Policy Directorate, The Joint Staff

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DEVELOPMENT: **Vice Admiral Evan M. Chanik, USN**

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Precision Strike Association presents *Winter Roundtable*

January 25, 2006



**Precision Requirements—New Policies
Creating Innovative Opportunities**



**Presentation of
10th Annual
William J. Perry
Award!**

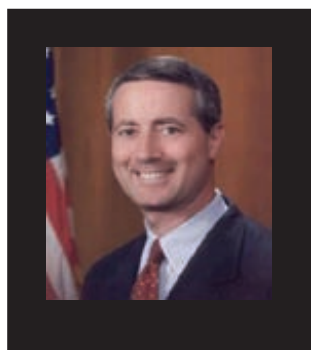


Crystal Forum—Crystal City Marriott, Arlington, VA

Registration Deadline: January 17, 2006



Vice Admiral Evan M. Chanik, USN
Director for Force Structure, Resources
and Assessment (J-8), The Joint Staff

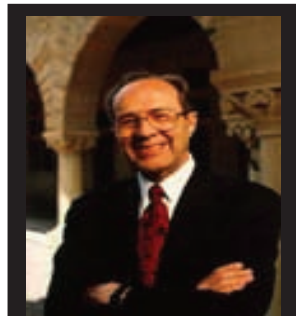


Representative Mac Thornberry (R-TX)
Member, House Armed Services Committee &
Chairman, Subcommittee on Oversight, House
Permanent Select Committee on Intelligence
(Invited)

Why Attend PSA's Winter Roundtable?

Few issues impact precision strike weapons and weapons systems more than requirements and the policy that derives those requirements. Winter Roundtable provides a forum that is focused on providing insights to requirements and policy from the perspective of those charged with implementing and executing both. Primary areas of focus that will enhance your understanding of new policies creating innovative opportunities include:

- Development of precision guided weapons over the decades.
- Congressional perspectives on precision engagement priorities and issues.
- Today's strategy; tomorrow's vision.
- Strategic direction the U.S. Armed Forces should follow to support National Security and Defense Strategies in this time of war.
- Future requirements for precision strike.
- Process for integrating requirements and joint capability areas development.
- Precision strike to precision effects.
- Importance of Service integration to identify warfighting shortfalls.
- New S&T futures for better precision engagement capabilities.
- UAS Roadmap—precision strike support.



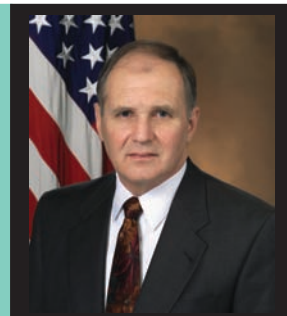
Honorable William J. Perry
Former Secretary of Defense
**To present the 10th Annual
William J. Perry Award**



**Major General
Charles N. Simpson, USAF**
Director for Joint Requirements
and Integration Directorate (J-8),
U.S. Joint Forces Command



Terry J. Pudas
Acting Director,
Force Transformation, Office
of the Secretary of Defense



Barry Watts
Senior Fellow, Center for
Strategic & Budgetary
Assessments

Who Should Attend?

Industry, Government, and International Weapons Systems Managers, Warfighters, Acquisition Professionals, Systems Analysts, Test Managers, Marketing Directors/Analysts, Business Development Managers, and Executive Management whose interests relate to weapons and precision engagement systems, their development, acquisition, sustainment, support, upgrade and employment.

Precision Requirements—New Policies Creating Innovative Opportunities

PROGRAM

Winter
Roundtable
2006

Wednesday
January 25, 2006
7:00am-4:30pm

Crystal Forum
Crystal City Marriott
1999 Jefferson Davis Hwy
Arlington, VA 22202
703-413-5500

Winter
Roundtable
Committee-2006

Programs Chair:
Ginny Sniegon

Programs Vice-Chair
CAPT Scott "Notso" Swift

Congressional Chair:
Dick Rumpf

Registration
Deadline
January 17, 2006

0700	REGISTRATION/CONTINENTAL BREAKFAST
0745	WELCOME: <i>Wayne Savage</i> —Chairman of the Board, Precision Strike Association
0750	SIX DECADES OF GUIDED WEAPONS: <i>Barry Watts</i> —Senior Fellow, Center for Strategic & Budgetary Assessments
0820	CONGRESSIONAL PERSPECTIVE: <i>Representative Mac Thornberry (R-TX)</i> —Member, House Armed Services Committee & Chairman, Subcommittee on Oversight, House Permanent Select Committee on Intelligence (Invited)
0900	OVERVIEW OF THE QUADRENNIAL DEFENSE REVIEW: <i>Speaker TBD</i>
0930	NETWORKING REFRESHMENT BREAK
1000	NATIONAL MILITARY STRATEGY OF THE UNITED STATES OF AMERICA: <i>Colonel Bradley W. May, USA</i> —Strategy Division Chief, J-5 Strategic Plans and Policy Directorate, The Joint Staff
1030	CHAIRMAN'S PROCESS FOR INTEGRATING REQUIREMENTS & JOINT CAPABILITY AREAS DEVELOPMENT: <i>Vice Admiral Evan M. Chanik, USN</i> Director for Force Structure, Resources and Assessment (J-8), The Joint Staff
1115	JOINT COMMAND AND CONTROL CRITICALITY TO PRECISION STRIKE: <i>Major General Charles N. Simpson, USAF</i> —Director for Joint Requirements and Integration Directorate (J-8), U.S. Joint Forces Command
1200	LUNCHEON & WILLIAM J. PERRY AWARD CEREMONY <ul style="list-style-type: none">• Luncheon at Crystal City Marriott• Chairman's Remarks: <i>Wayne Savage</i>• Special Remarks: <i>Dr. Bill Perry</i>—Former Secretary of Defense• Select Representatives Remarks: <i>Speakers TBD</i>• Presentation of William J. Perry Award to the <i>Tactical Tomahawk Team</i>• Recipients' Remarks: <i>Select Tactical Tomahawk Government and Industry Team Members</i>
1330	CONGRESSIONAL PANEL—PRIORITIES AND ISSUES: <i>Select SASC, HASC, SAC & HAC Professional Staff Members</i> Moderator: <i>Dick Rumpf</i> —President, Rumpf Associates International
1420	PRECISION STRIKE TO PRECISION EFFECTS: <i>Terry J. Pudas</i> —Acting Director, Force Transformation, Office of the Secretary of Defense
1500	NETWORKING REFRESHMENT BREAK
1520	NEW S&T FUTURES FOR NAVY-MARINE CORPS—CRITICAL CAPABILITIES FOR 2020: <i>Dr. Michael B. Deitchman</i> —Head, Air Warfare and Weapons Department, Office of Naval Research
1550	UNMANNED AIRCRAFT SYSTEMS (UAS) ROADMAP—PRECISION STRIKE SUPPORT: <i>Dyke Weatherington</i> —Deputy for Unmanned Aerial Vehicles Planning Task Force, Office of the Under Secretary of Defense for Acquisition, Technology & Logistics, OSD
1630	CLOSING REMARKS: <i>Wayne Savage</i>

General Information

REGISTRATION

On-Line: Register for this conference on-line at <http://www.precisionstrike.org>. You will be directed to the NDIA registration web page. You will receive an emailed confirmation after you use the CONFIRM button on the web page. When registering online, please review your information then "submit" and "confirm" your entry. **PLEASE** make sure you check your account information for accuracy (i.e.: spelling of name, address, company name, email address, phone number, etc).

Fax: Complete registration form with payment information and fax to **703-527-5094**

Mail: Complete registration form **with payment** to: **PSA Event #6WIN**, 2111 Wilson Blvd., Suite 400, Arlington, VA 22201-3601

Acceptable forms of payment include: Checks (with mailed registrations); Credit cards: Visa, Master Card, American Express, Diners Club but not Discover Card.

Payment must be made at time of registration. **A late fee of \$50 will be added to any registration received after January 17, 2006. Please register onsite after the deadline date. Non-member fee includes individual membership in PSA for a one-year period.**

FINAL AGENDA AND ATTENDANCE ROSTER

A final (revised) agenda and attendance roster will be distributed at the meeting. In order to appear on the roster, your completed registration and payment must be received by COB Tuesday, January 17th. An updated roster will not be printed after the conference.

ATTIRE

Appropriate dress for this conference is business attire for civilian and uniform of the day for active military .

CANCELLATIONS AND REFUNDS

All cancellations and refund requests must be received in writing to Precision Strike Association, 2111 Wilson Blvd, Suite # 400, Arlington, VA 22201-3061, Fax to: **703-527-5094**, or by e-mail: info@precisionstrike.org no later than **January 17, 2006. After this date NO refunds will be given for any cancellations.** Substitutions are welcome prior to the day of the event. This refund policy applies to all attendees regardless of their method of registration or reason for cancellation.

ACCOMMODATIONS

PSA has reserved a block of rooms at the conference site hotel: Crystal Gateway Marriott. When making reservations please reference **"Precision Strike Association"** to obtain the special rate.

Crystal City Marriott:

1999 Jefferson Davis Hwy
Arlington, VA 22202
703-413-5500 or 800-228-9290

Group Room Rate: \$179 for January 24, 2006

Cut off date for this rate: January 3, 2006

DISABILITIES

PSA/NDIA supports the Americans with Disabilities Act of 1990. Attendees with special needs should call (703) 247-2590, before January 17, 2006.

PROCEEDINGS

The proceedings for Winter Roundtable will be available for all attendees online 2-3 weeks after the event. The URL for the proceedings will be included in the conference materials to be distributed at the symposium. Copies of the CD will be available for purchase for those who cannot attend. The price for the WRT proceedings CD is \$250. Please note that not all presentations are included in the proceedings. The decision to include is left up to the presenter.

DoD APPROVAL

"The Department of Defense finds this event meets the minimum regulatory standards for attendance by DOD employees. This finding does not constitute a blanket approval or endorsement for attendance. Individual DoD Components commands or organizations are responsible for approving attendance of its DOD employees based on mission requirements and DOD regulations."

**PSA would like to
recognize and thank**

Raytheon

**for sponsoring Winter Roundtable
and the William J. Perry
Award Luncheon**

PRECISION STRIKE WINTER ROUNDTABLE

Registration Form

Crystal Forum - Crystal City Marriott, Arlington, VA
25 January 2006

Precision Strike Association

2111 Wilson Boulevard, Suite 400
Arlington, VA 22201-3061
(703) 247-2590 • (703) 527-5094 fax
www.precisionstrike.org



Ways to sign up: 1. Online with a credit card at www.precisionstrike.org

2. By fax with a credit card — Fax: 703-527-5094

3. By mail with a check or credit card

☐ Address change needed

PSA Master ID/Membership # _____ Social Security # _____
(if known—hint: on mailing label above your name) (last 4 digits — optional)

Prefix _____ First Name _____ MI _____ Last _____
(e.g. RADM, COL, Mr., Ms., Dr., etc.)

Military Affiliation _____ Nickname _____
(e.g. USMC, USA (Ret.) etc.) (for Meeting Badges)

Title _____

Organization _____

Street Address _____

Address (Suite, PO Box, Mail Stop, Building, etc.) _____

City _____ State _____ Zip _____ Country _____

Phone _____ ext. _____ Fax _____

E-Mail _____

Signature* _____ Date _____

Preferred way to receive information

Conference information ☐ Address above ☐ Alternate (print address below) ☐ E-mail

Subscriptions ☐ Address above ☐ Alternate (print address below)

Alternate Street Address _____

Alternate Address (Suite, PO Box, Mail Stop, Building, etc.) _____

City _____ State _____ Zip _____ Country _____

* By your signature above you consent to receive communications sent by or on behalf of NDIA, its Chapters, Divisions and affiliates (NTSA, AFEI, PSA, NCWG, WID) via regular mail, e-mail, telephone, or fax. NDIA, its Chapters, Divisions and affiliates do not sell data to vendors or other companies.

By completing the following, you help us understand who is attending our meetings.

Primary Occupational Classification. Circle ONE.

- A. Defense Business/Industry
- B. R&D/Laboratories
- C. Army
- D. Navy
- E. Air Force
- F. Marine Corps
- G. Coast Guard
- H. DOD/MOD Civilian
- I. Gov't Civilian (Non-DOD/MOD)
- J. Trade/Professional Assn.
- K. Educator/Academia
- L. Professional Services
- M. Non-Defense Business
- N. Other _____

Current Job/Title/Position. Circle ONE.

- A. Senior Executive
- B. Executive
- C. Manager
- D. Engineer/Scientist
- E. Professor/Instructor/Librarian
- F. Ambassador/Attaché
- G. Legislator/Legislative Aide
- H. General/Admiral
- I. Colonel/Navy Captain
- J. Lieutenant Colonel/Commander/ Major/Lieutenant Commander
- K. Captain/Lieutenant/Ensign
- L. Enlisted Military
- O. Other _____

Year of birth _____
(Optional)

Registration Fees

	On-Time Registration	Late Registration After 1/17/05
PSA/NDIA Member*	\$295	\$345
Non-Member**	\$335	\$385
Government/Academia	\$270	\$320

*Media and speakers: Please fax your form into Dawn Campbell directly at 703-527-5094.

Registration DEADLINE: January 17, 2006

**REGISTRATION FEES WILL INCREASE \$50
AFTER THIS DATE**

NO refunds for cancellations received after this date.

Substitutions Welcome! Please email request.

* Including NDIA and all affiliates

** Includes a free one-year PSA membership and National Defense magazine for Military and Government employees (first time members only).

HOW DID YOU RECEIVE THIS FORM?

☐ Brochure Mailing ☐ PSA Website ☐ NDIA Website
☐ Other: _____ ☐ Email

Payment Options

☐ Check (payable to PSA) ☐ Cash ☐ VISA ☐ MasterCard
☐ American Express ☐ Diners Club

☐ Government PO/Training Form # _____

If paying by credit card, you may return by fax to (703) 527-5094.

Credit Card Number _____ Exp. date _____/____/____

Signature _____ Date _____

Questions? Contact: Dawn Campbell
Office: (703) 247-2590 (fax) 703-527-5094

Mail to: Precision Strike Association (PSA)
Event #6WIN
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Arlington, VA 22201

For more information, please see our website:
www.precisionstrike.org or **email:** info@precisionstrike.org

Affiliate: NDIA (National Defense Industrial Association)

*Congratulations to
the 2006 Recipients
of the
William J. Perry
Award*

**Tactical
Tomahawk Team**

Dr. William J. Perry to
present award at the
Winter Roundtable
luncheon

CALENDAR OF EVENTS

ANNUAL PROGRAMS REVIEW

April 18-19, 2006

Role of Precision Engagement in Asymmetric Warfare

Location: Crystal City Marriott-Arlington, VA

SUMMER PEO FORUM

July 25-26, 2006

Theme: TBD

Location: San Diego Marriott & Marina-San Diego, CA

PRECISION STRIKE TECHNOLOGY SYMPOSIUM

October 17-19, 2006

Theme: TBD

Location: The Johns Hopkins University/Applied Physics
Laboratory, Kossiakoff Center-Laurel, MD

**Sponsorship and exhibit opportunities
available for all events.**

Registration deadline January 17, 2006
For more information or to register online go to www.precisionstrike.org

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Precision Strike Proficiency & Sufficiency



**Precision Strike Association
25 January 2006**

**Vice Admiral Marty Chanik
Director, J-8, Force Structure, Resources and Assessment Directorate
The Joint Staff**

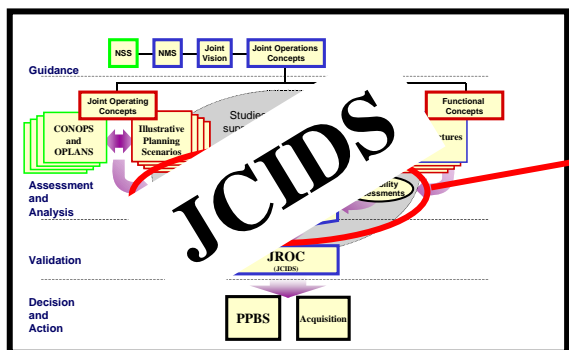


Agenda

- **Proficiency**
- **Sufficiency**
- **Way Ahead**

Proficiency and Sufficiency

Two Munitions Processes



“WHAT DO WE BUY?”

JCIDS

CJCSI 3170.1E

May 2005

Capability Based

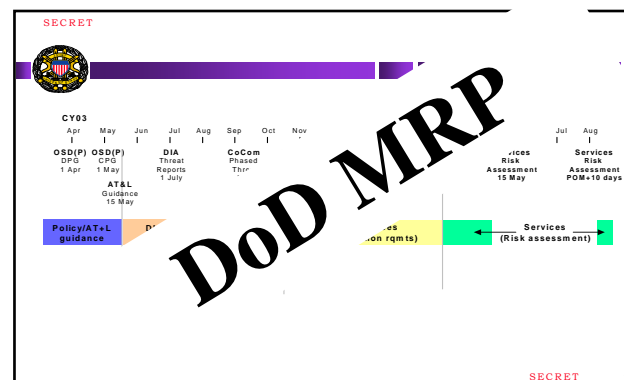
Purpose

Driver

Implementing Doc

Date Implemented

Basis



“HOW MUCH OF EACH DO WE BUY?”

PPBES

DoDI 3000.4

October 2003

Scenario Based



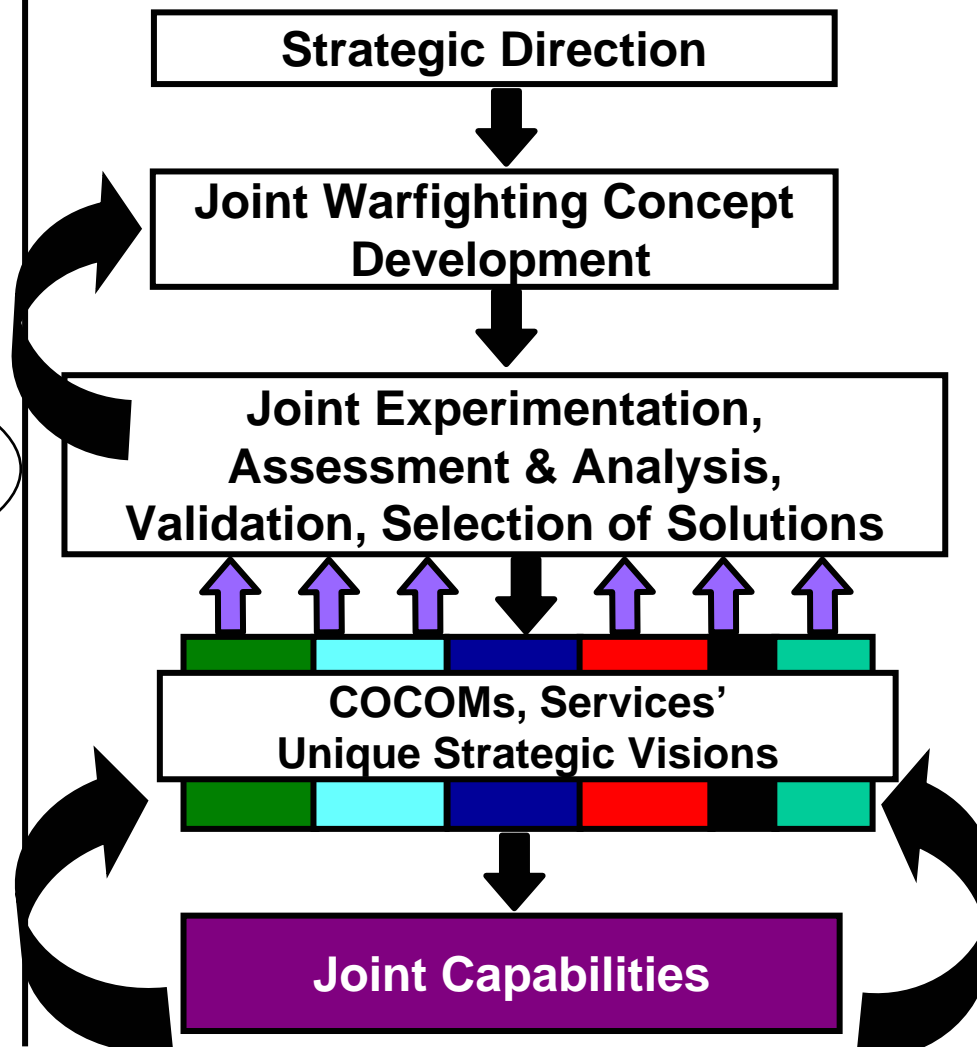
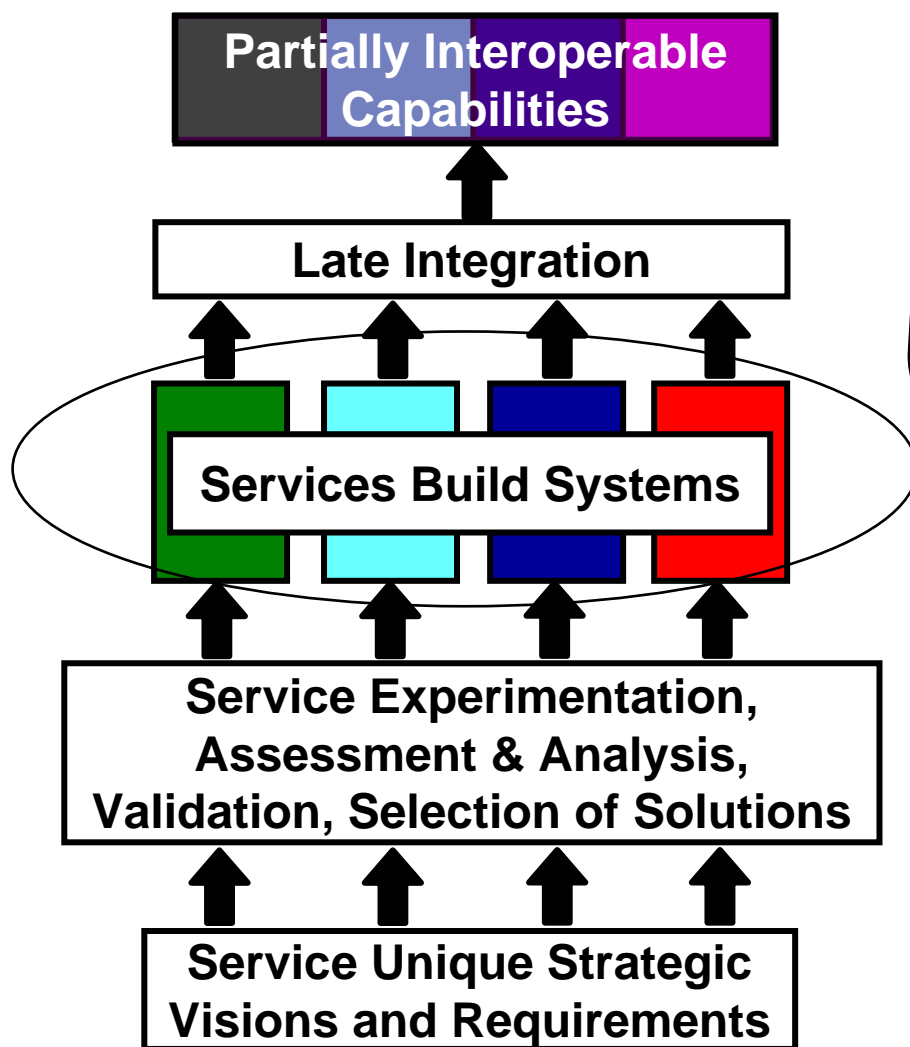
PROFICIENCY



Threat vs Capability Based Planning

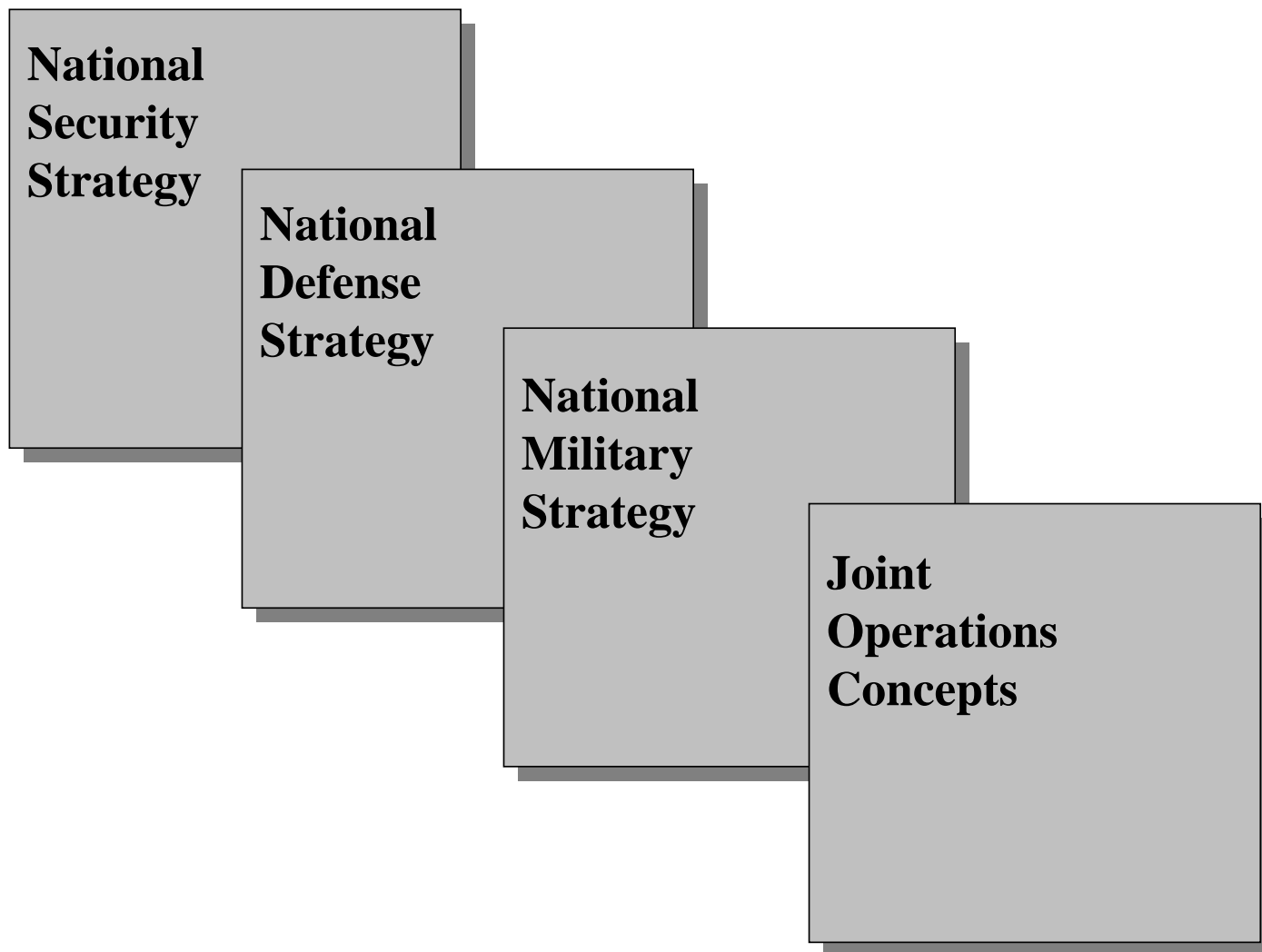
Requirements Generation System (RGS)- ~30 years of experiences

Joint Capabilities Integration and Development System (JCIDS)- 2 years old





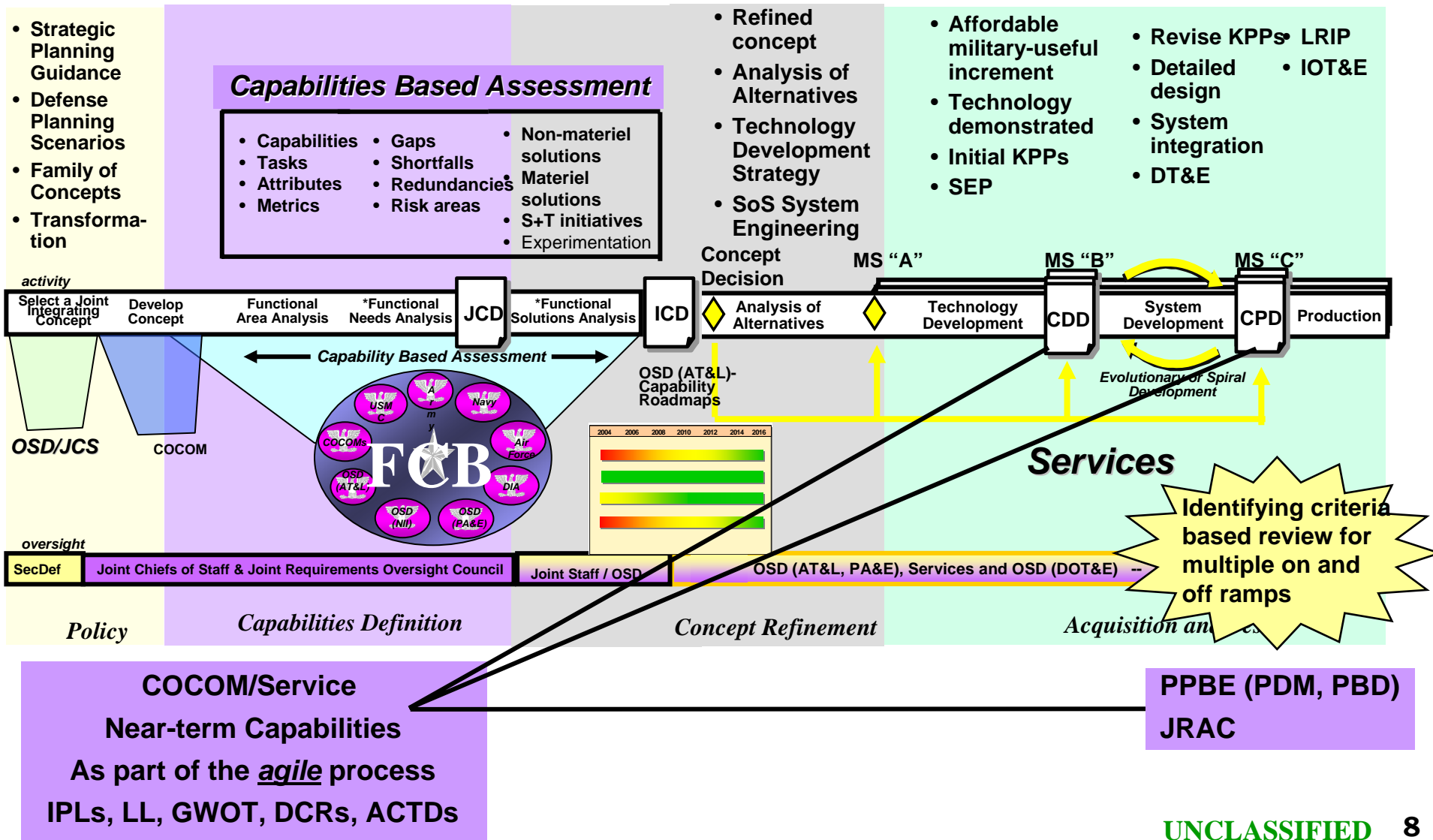
Strategy Based Capabilities





Agile DOD End-to-End Concepts, Capabilities, and Acquisition Process

DAB Capability Area Reviews (CARs)



How It Should Work



CBA

•CBA on Major Combat Operations

–Lethal capability in adverse weather

ICD

–GPS / INS kit

–Smaller weapon for greater loadout capability

CDD
CDD

–JDAM tail kits

–SDB I and SDB II

CPD

CPD
CPD
CPD
CPD
CPD
CPD
CPD



CBP Lessons Learned

- **Capabilities Based Assessments take a long time**
 - New “Users Guide” will help focus efforts and set terms of reference
 - Focus efforts toward a solution – fight the urge “to solve world hunger”
- **Prioritization of capabilities is the goal**
 - Use Joint Capability Areas to help refine our thinking
 - Focus JROC attention on major issues
- **KPPs**
 - Criteria for selection
 - Cost drivers for each



Tier 1 JCAs

- **Joint Force Generation**
- **Joint Force Management**
- **Joint Battlespace Awareness**
- **Joint C2**
- **Joint Net-Centric Operations**
- **Joint Public Affairs Operations**
- **Joint Interagency / IGO/ NGO/ Coordination**
- **Joint Protection**
- **Joint Logistics**
- **Defense Support of Civil Authorities**
- **Joint Homeland Defense**
- **Joint Global Deterrence**
- **Joint Shaping**
- **Joint Stability Operations**
- **Joint Information Operations**
- **Joint Access & Access Denial**
- **Joint Special Operations & Irregular Operations**
- **Joint Land Operations**
- **Joint Maritime /Littoral Operations**
- **Joint Air Operations**
- **Joint Space Operations**



Tier 2 JCAs

- **Joint Access & Access Denial**
 - Forcible Entry, LOC Protection, Contingency Basing, Seabasing, Freedom of Navigation, Blockade
- **Joint Land Operations**
 - Op Movement and Maneuver, Joint Fires, Decisive Maneuver, Security
- **Joint Maritime/Littoral Operations**
 - Surface Warfare, Undersea Warfare, Maritime Interdiction, Maritime Expeditionary Ops, Maritime Fires, Observe & Collection, Theater Air & Missile Defense
- **Joint Air Operations**
 - Offensive Counter Air Ops, Strategic Attack, Air Interdiction, Tactical Air Support, Theater Air & Missile Defense, Battlefield Deconfliction



Success Stories

- **Joint Undersea Superiority**
 - First ICD on MCM staffing complete, headed to FCB
 - Additional ICD for ASW in work
- **The Global Strike Raid Scenario CBA**
 - FNA complete
 - FSA in work; coordinating with Prompt Global Strike and other efforts
- **Sea-basing and JC2 CBAs ongoing**



Success Stories - JETS

Joint Effects Targeting System (JETS) is a single joint targeting system designed to replace 20+ stove-piped and non-interoperable targeting systems.

- Joint Integrated Product Team
 - Stove-piped efforts addressed similar issues.
 - Nearly identical capability requirements
- JCIDS “CBA” resulted in approved ICD. Single Joint solution found to be best alternative.



SUFFICIENCY



Munitions Requirement Process

Threat Report

DIA

Maneuver Forces
Air
Maritime
IADS
Infrastructure
Strategic

**CoCOM
J8 WAD**

Phased Threat Distribution

Allies

SOCOM

USMC (Air & Ground)

USA

USN

USAF

Phase I: $w\%$

Phase II: $x\%$

Phase III: $y\%$

Phase IV: $z\%$

Total Munitions Requirement

- Combat Requirement
- Strategic Readiness Requirement
- Current Operations/Forward Presence Requirement
- Test & Training Requirement

Service Processes

NNOR
NCAA
QWARRM

Services



MRP Vision for the Future

- **Strategy is still the driving force, but...**
- **Challenge is determining the right mix:**
 - **Surge Capability**
 - **Shelf life**
 - **Demil/Surveillance**
 - **Risk/Budget**
 - **Industrial base**
- **Weapons must be agile across scenarios**
- **Discipline/Rigor accomplished by aligning with the analytic agenda**



Way Ahead

- **Proficiency**
 - **JCIDS Process is Evolving**
 - **Reducing Cycle Time**
 - **CBA Standards Developing**
 - **Gap Analysis for Capabilities**

GOAL: Prioritization of Joint Capabilities



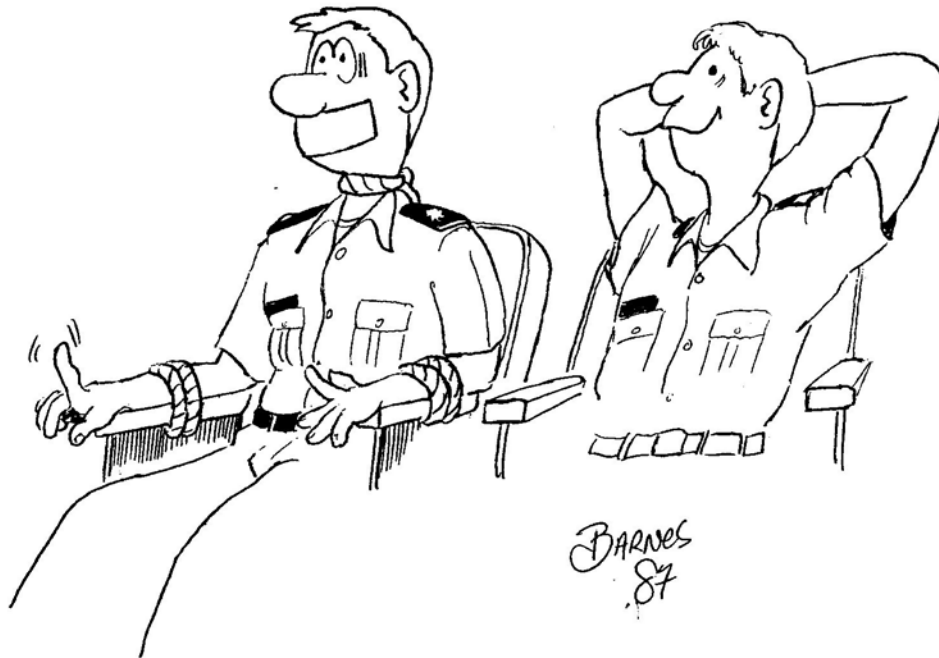
Way Ahead

- **Sufficiency**
 - **MRP vastly improved in the past two years**
 - **COCOMs, Services, Joint Staff, and OSD involved**

GOAL: ID Requirements (Qty); Balance Acceptable Operational Risk with the Industrial Base



ANY QUESTIONS?





PSA Roundtable

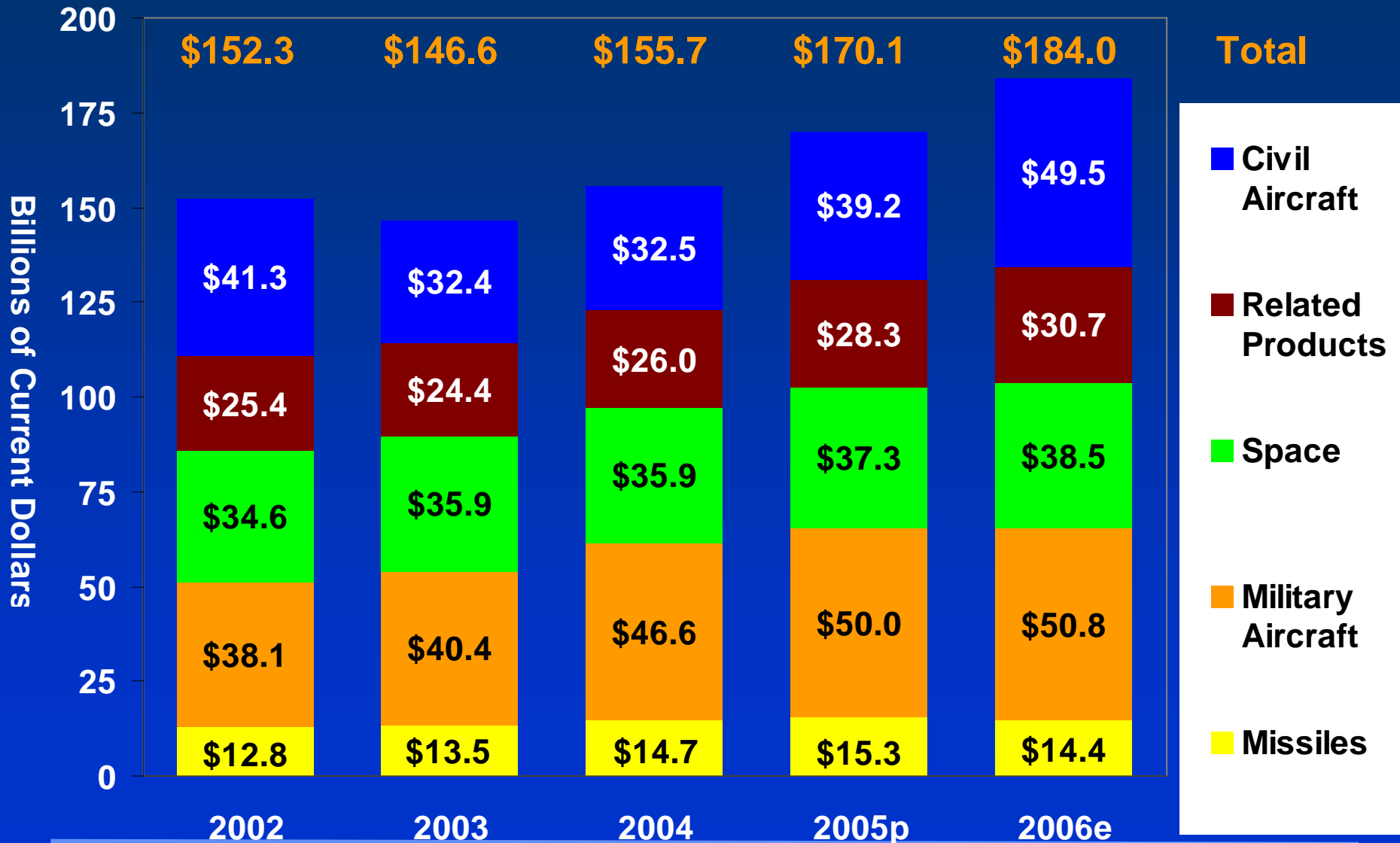
Industry Perspective: Congressional Priorities

AIA President and CEO John Douglass

January 25, 2006

Arlington, VA

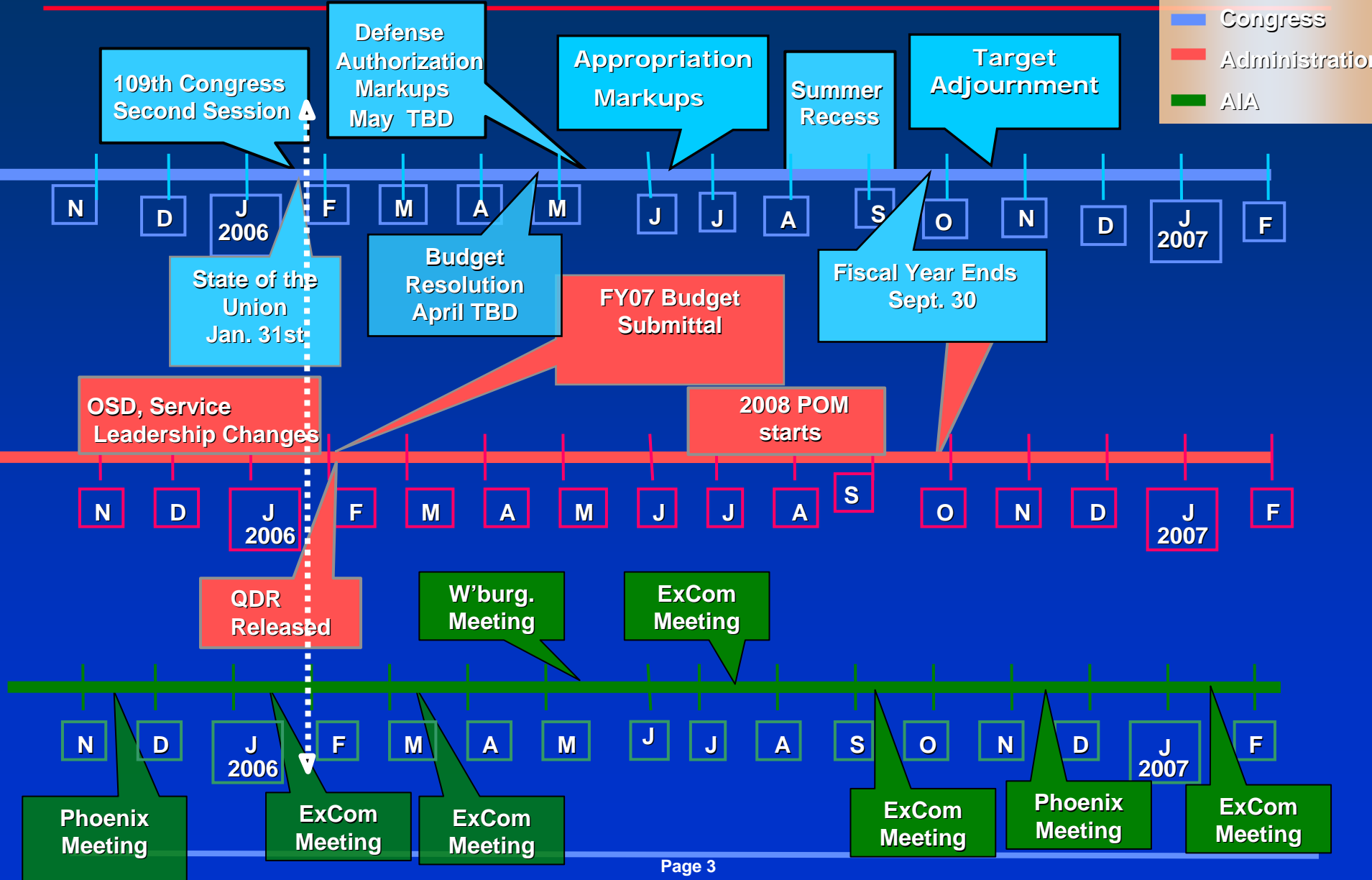
Aerospace Industry Sales



Washington Activities



- Congress
- Administration
- AIA



– AIA defense focus on hill policy oriented

- Acquisition excellence – Hearings on Kadish Report expected
- Export Control reform
- Industrial Base

– AIA supports lobbying reform

Current Pentagon Environment

- **Leadership: Dep. Sec. England**
- **QDR: Reported to be a non-event**
 - No new strategies are outlined in the review
 - It is designed mostly to support the 2007 Budget
- **2007 Budget**
 - Appears to be based on the President's FY07 position as stated in the FY06 Budget
 - Selective impacts to industry
 - War financing accomplished through supplementals
 - Final numbers are still uncertain
 - Some industrial base issues
- **Acquisition Excellence**
 - Kadish Panel report
 - Focused on program stability and quality of leadership
 - Secretary England will be the key to implementation
 - Some key recommendations may be resisted by Congress and OSD staff
 - Funding for program stability
 - More control over programs by the services
 - Role of the Service Chiefs
 - Armed Services Committee hearings are likely in 2006



Future of Precision Strike



Results of the Quadrennial Defense Review

**Precision Strike Association
Winter Roundtable**

COL Pat Kelly

QDR Integration Team

Office of Under Secretary of Defense for Policy

Introduction

- ❑ **A wartime QDR: conducted in 4th year of a long, irregular war**
- ❑ **20 year look – must prevail in current war and also prepare for wider range of challenges**
- ❑ **Twin imperatives of review:**
 - Continue reorientation of capabilities to address asymmetric challenges (more irregular, catastrophic and disruptive in character)...
 - ...while changing the Defense enterprise to support and accelerate that reorientation
- ❑ **“Interim” product**
 - How far we’ve come and where we are going...give President more options

QDR Vectors: Shifting Balance

Operational: *From massing forces to massing effects*

- ❑ Short-duration major combat to long-duration irregular operations (*within broader spectrum of military activities*)
- ❑ Joint forces that were *deconflicted*, to *interdependent and coherent*
- ❑ Responsive to anticipatory: *early measures to prevent problems from becoming crisis and crisis from becoming conflicts*



- ❑ Find, fix, and FINISH to FIND, *fix*, and finish
- ❑ Exposed forces forward to more leveraged reach-back
- ❑ Moving the user to the data to moving the data to the users

Shifting Balance (continued)

Force Posture: *from counting numbers to delivering capabilities*

- ❑ **Garrisoned to global expeditionary**
- ❑ **Strategic reserve component to an operational reserve component**
- ❑ **Large institutional base force to greater number of operationally available forces**
- ❑ **“One size fits all” deterrence to tailored deterrence**
for near-peer competitors; rogue powers; and terrorists and their networks



Shifting Emphasis (continued)

Institutional Focus: *from organization-specific to enterprise-wide approaches*

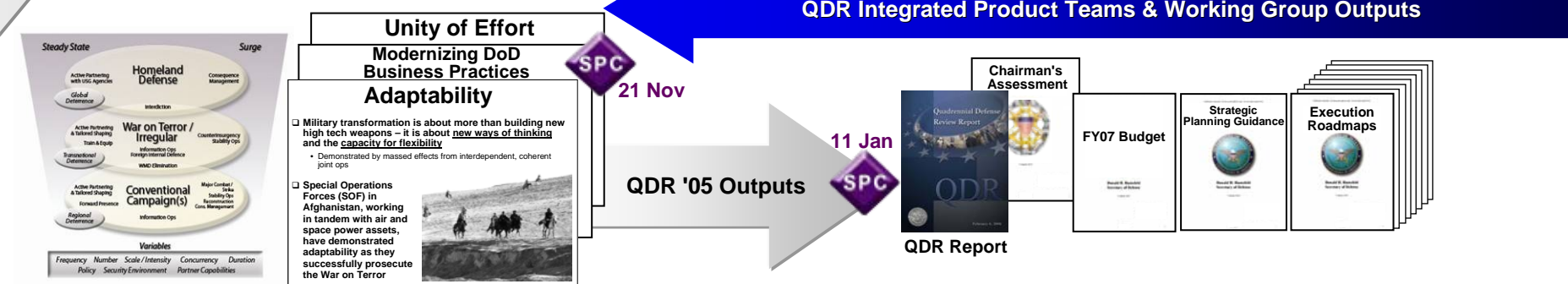
- ☐ **Enabling others to provide
for their own security and / or capabilities**
- ☐ **Threat-based planning
to adaptive capabilities-based planning**
- ☐ **Single department
to inter-agency solutions**
- ☐ **Stove-piped vertical structures and processes
to transparent horizontal organizational integration**
- ☐ **Systems acquisition
to capabilities-based portfolio management**
- ☐ **Personnel incentives based on longevity
to incentives based on performance**



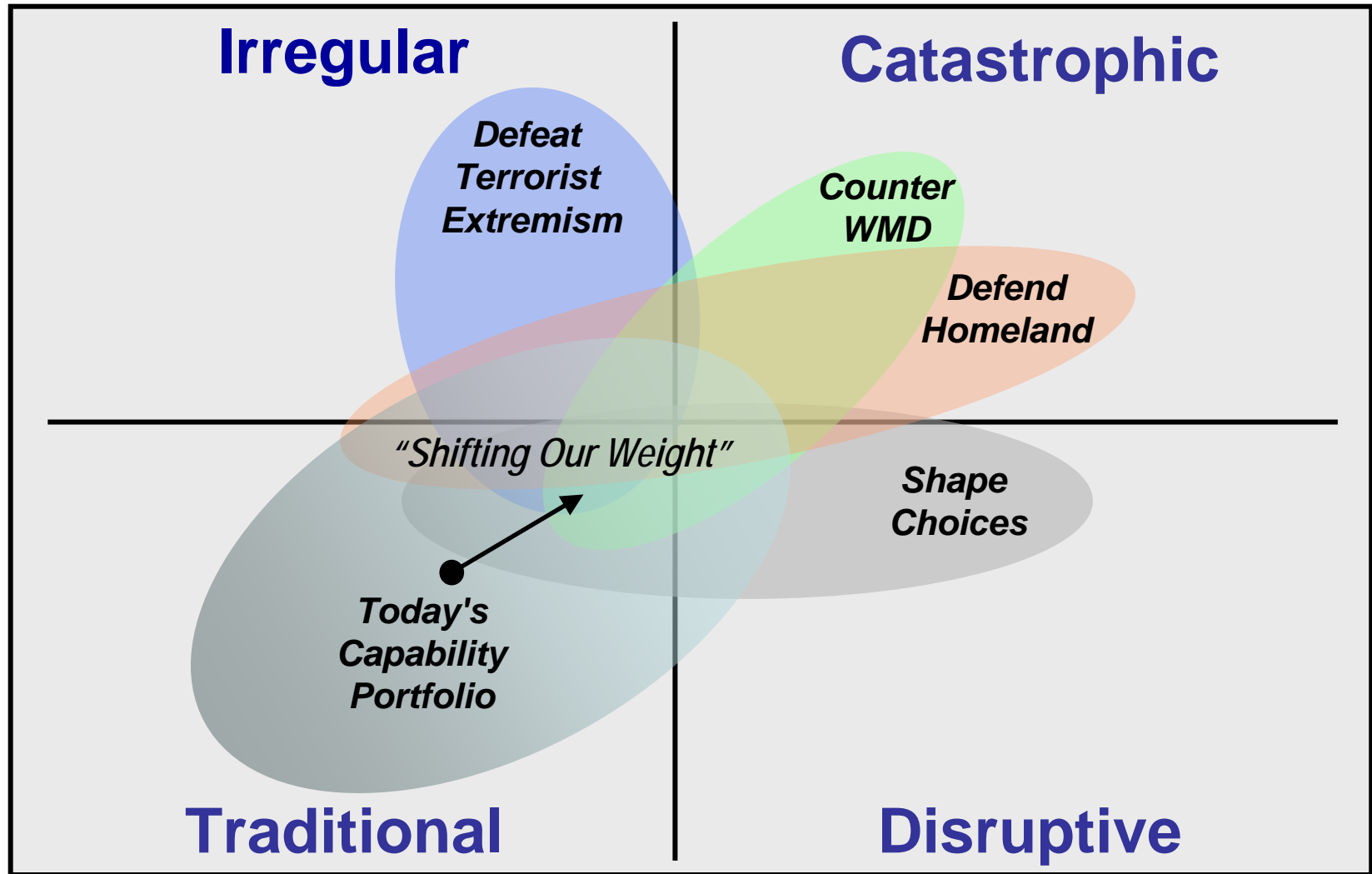
Fighting a Long War – Lessons Learned

- ❑ **Capitalized on lessons learned from operational experiences of the past 4 yrs:**
 - Afghanistan and Iraq;
 - Wider irregular operations as part of the long war – Philippines, Horn of Africa, Georgia, Pan-Sahel, elsewhere;
 - Humanitarian (tsunami, Pakistani earthquake) and preventive actions (Haiti, Liberia); and
 - Operations in support of civil authorities at home (9/11, Katrina)
- ❑ **Key lessons from these operations informed QDR – importance of:**
 - Building partnership capacity (a more indirect approach to defeat enemy);
 - Early preventive measures;
 - Maintaining and expanding US freedom of action to confront enemies; and
 - Cost-imposing strategies (competitive strategies)

**Continuous change and assessment...inherently interim report
FY07 leading edge investments; FY08-13 Defense Program; Roadmaps**



Re-balancing Future Force Capabilities

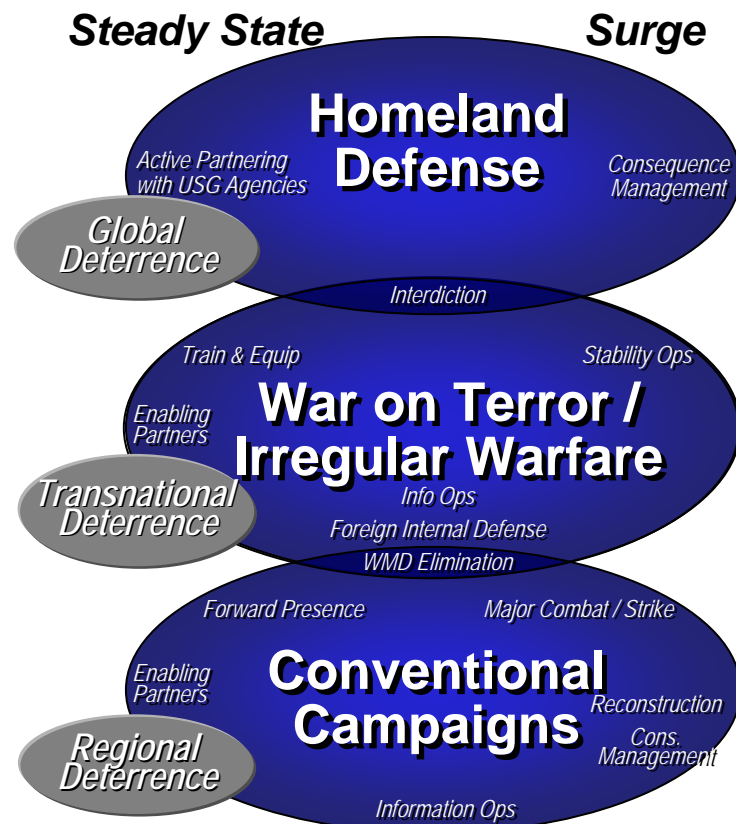


Continuing the reorientation of military capabilities and implementing enterprise-wide reforms to ensure structures and process support the President and the warfighter

Refined Force Planning Construct

Construct for shaping the future force

- ❑ **Steady-state & surge operations**
 - Homeland Defense
 - Sustained Irregular Warfare
 - Conventional Campaigns
- ❑ **Tailored Deterrence**
 - Advanced military competitors, regional WMD regimes, terrorist networks
 - Strengthened deterrence against opportunistic aggression/coercion
- ❑ **Two-war capacity**
 - Varying levels of effort
 - Stress-on-the-force elasticity



Sizing Variables:

Frequency	Number	Scale / Intensity
Concurrency	Ops	Risks
Policy	Environment	Partner Capabilities
		Duration

Re-shaping the Defense Enterprise

The Department's business practices and processes need to be responsive, agile and flexible to efficiently and effectively meet joint warfighting needs.

❑ Current state

- Decision making processes lack speed, integration and appropriate focus
- Can't rationally allocate resources to capabilities to missions
- Seams among DoD Components and other agencies must be bridged

❑ We will manage the future enterprise better by

- Aligning Department activities through horizontal integration; promote and reward collaboration
- Engaging in a coordinated and portfolio-based approach to planning, programming, and budgeting
- Reforms at three levels: governance, management, and execution
- Governance: strategic direction, identity, acquisition & resource allocation, corporate decision-making, performance assessment, and force employment



Developing a 21st Century Total Force

❑ Getting the right people and skills

❑ Reducing stress on the force

- Shifting from RC as a strategic reserve to RC as an operational reserve
- Rebalancing Combat Service Support between RC and AC;
- Need for new authorities to achieve a “Continuum of Service” for Reservists

❑ Managing Personnel

- Building off of the new National Security Personnel System
- Stressing competency-focused and performance-based management of personnel
- Human Capital Strategy



Achieving Unity of Effort

The United States, and in particular DoD, cannot win this war alone

- ❑ Requires integration of all USG capabilities and greater cooperation with allies and partners

How we will achieve unity of effort

- ❑ Integrate federal, state and local capabilities at home and enable others

- National Security Planning Guidance and National Homeland Security Plan
- Training programs with other agencies and interagency consequence management exercises
- National Security Officer (NSO) corps; transform National Defense University to National Security University

- ❑ Work with traditional and non-traditional partners

- Leverage collective capabilities to plan and conduct Stability, Security, Transition, and Reconstruction missions
- Expand authorities to train and equip foreign security forces
- Institutionalize OIF/OEF special authorities



Way Ahead

☐ Key outputs

- QDR Report (Feb 2006)
 - FY07 budget request
 - Strategic guidance for FY08 and beyond
- Chairman's Independent Risk Assessment

☐ Applying QDR strategic direction FY 08-13 future year defense program

☐ Outreach efforts and continual inclusion

☐ Execution Roadmaps

- DoD Institutional Reform & Governance
- Strategic Communication
- Building Partnership Capacity
- Sensor-based management of the ISR enterprise
- Authorities
- Irregular Warfare
- Joint Command & Control
- Locate, Tag, Track

QUESTIONS?



Transforming National Security

Precision Strike

Information Age

to

Precision Effects

Vision: Broad and Sustained Competitive Advantage

- *Strategy*
- *Capabilities*
- *Metrics*

Industrial Age

Terry J. Pudas
Acting Director, Force Transformation
25 January, 2006



Transforming Defense

...The Concept

Elements of Transformation

- ☑ Continuing process
- ☑ Creating/anticipating the future
- ☑ Co-evolution of concepts, processes, organizations, and technology
- ☑ New competitive areas/competencies; revalued attributes
- ☑ Fundamental shifts in underlying principles
- ☑ New sources of power
- ☑ Culture - attitudes, values, beliefs

- *New Strategic Context*
- *Broadened Threat Context*
- *Technological Threats*
Facilitated by Falling Barriers to Competition

"The ultimate competitive advantage lies in an organization's ability to learn and rapidly transform that learning into action."

Jack Welsh



Transforming Defense

...Compelling Need

- New strategic context

New Theory of War based on information age principles and phenomena

New relationship between operations abroad and homeland security

New concept/sense of security in the American citizen

- Broadened threat context

State/Non-State

Symmetric/Asymmetric

Traditional/Unrestricted

- New technological threats facilitated by the falling barriers to competitive entry

Immediate accessibility to highly capable low cost IT

Opens key operational domains to competition: space, sea, cyberspace

To the extent we do not transform, we are at risk



Transforming Defense

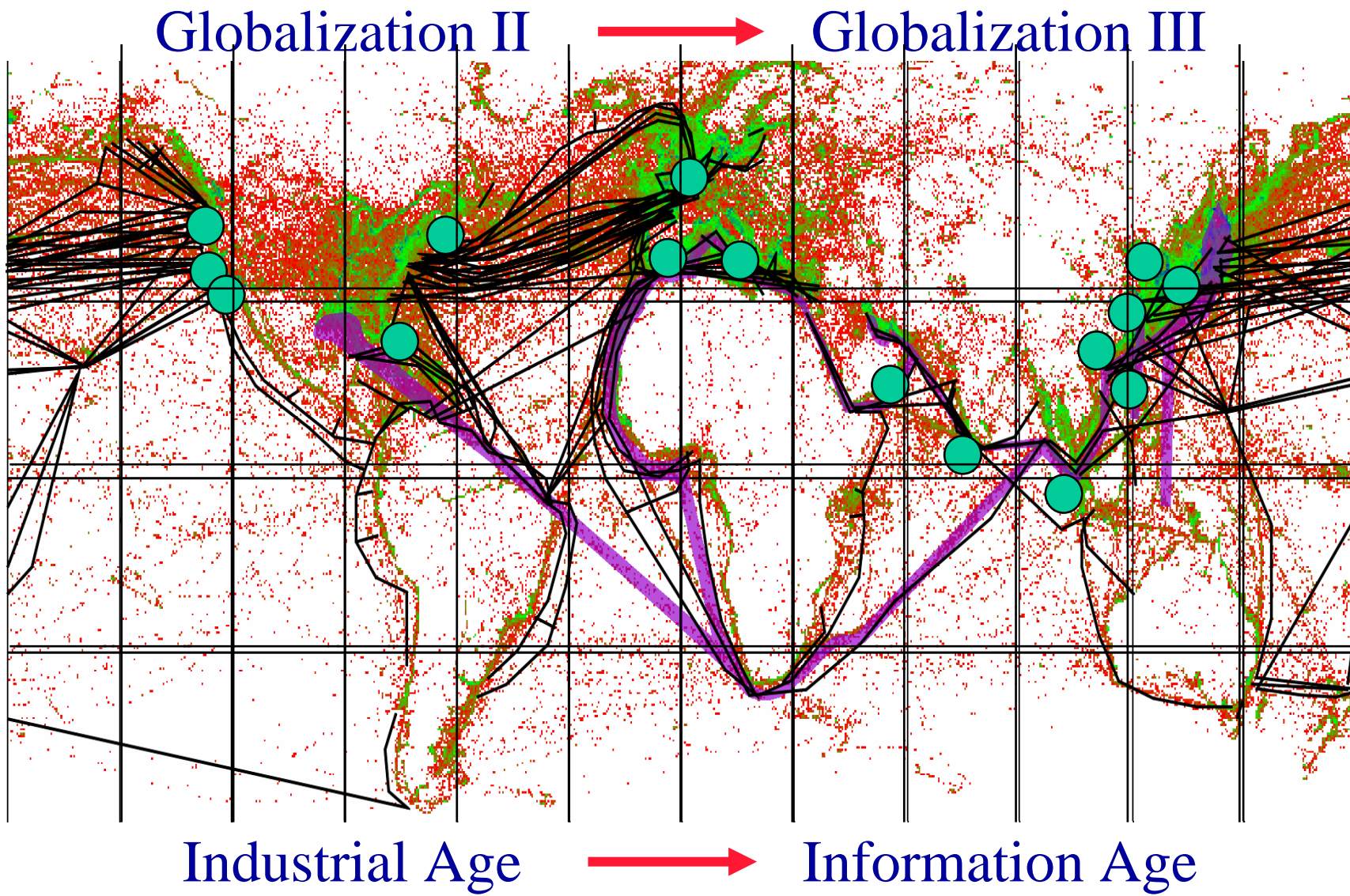
...Elements of Strategy

- Transform from Industrial Age to the Information Age
Implement Network Centric Operations
- Ensure sustained competitive advantage
Assure Allies
Dissuade competitive entry
Underwrite deterrence
Implement countervailing strategies
- Broaden the capabilities base
Operational, Technical, Industrial
Create new competitive areas
Revalue competitive attributes for the information age
Decrease capabilities cycle time
- Leverage advantages and opportunities
Manage the devolution of “sunset” capabilities and processes

Achieve Speed and Agility vice Optimization



Global Trends





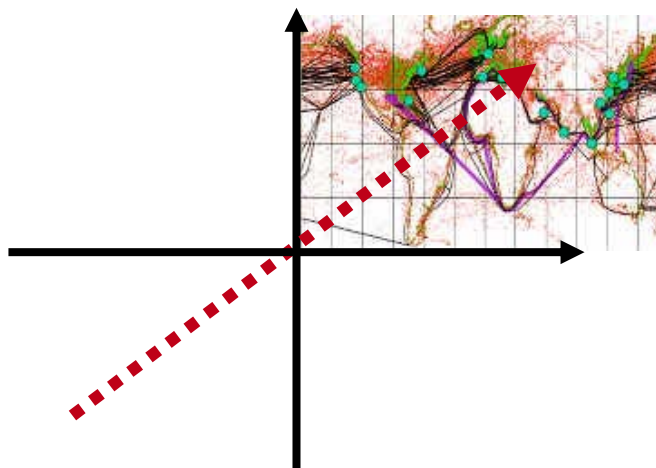
Trends in Security Competition

Information Age

- Short Cycle Time
- Mass Customization
- Adaptive Planning
- Interdependence

Globalization II (1947 – 199X)

- Developed Rules
- Mature Markets
- Narrowing Customer Base
- Security = Defense



Globalization III (199X – 20XX)

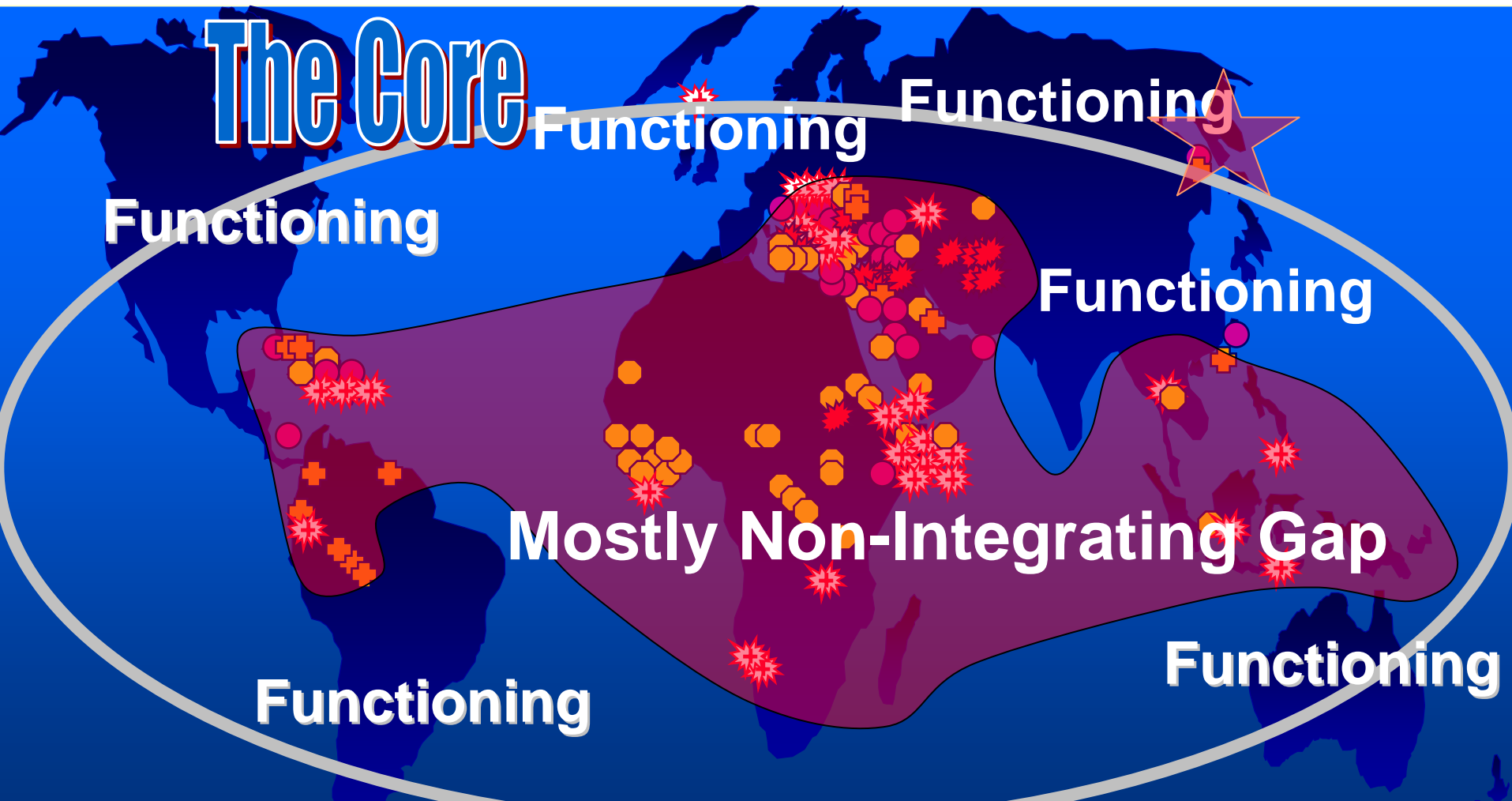
- Emerging Rules
- Market Opportunities
- New Customer Base Emerging
- Security = All Else + Defense

Industrial Age

- Long Cycle Time
- Mass Production
- Deliberate Planning
- Tortured Interoperability



Globalization III

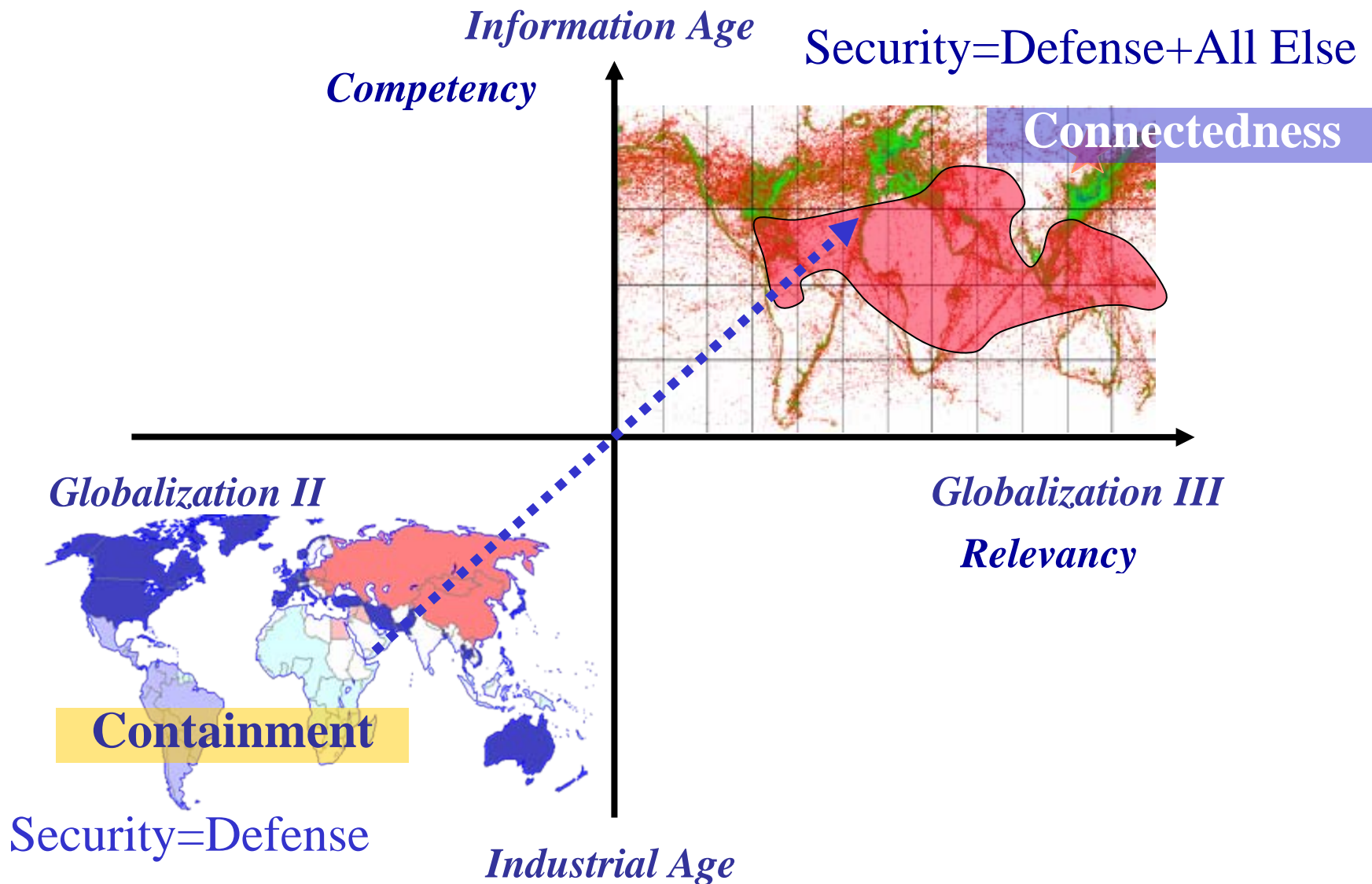


U.S. Military Responses to Situations, 1990-2002





Shifting Strategic Imperatives



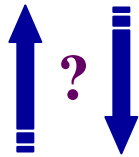


Security Environment

... *Four Challenges*

Irregular

Those seeking to erode American influence and power by employing unconventional or irregular methods



Catastrophic

Those seeking to paralyze American leadership & power by employing WMD or WMD-like effects in unwarned attacks on symbolic, critical or other high-value targets

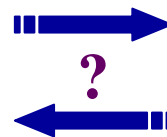


Traditional

Those seeking to challenge American power by instigating traditional military operations with legacy and advanced military capabilities

Disruptive

Those seeking to usurp American power and influence by acquiring breakthrough capabilities



No hard boundaries distinguishing one category from another



Capabilities Balance

...Competent and Relevant

**Domain of
Cooperative
Engagement**

Winning / Maintaining the Peace
All Sources of Power

**Domain of
Political Victory**

Strategic Advantage:

The Commons

**High Seas & Air Above
Space
Cyberspace**

Global Stability

Winning the War

Local Stability

Intervention:

Decisive Operations

**Land
Littorals
Low Altitude**

**Domain of
Strategic
Primacy**

Winning the Battle / Combat
Combat Power

**Domain of
Military
Victory**

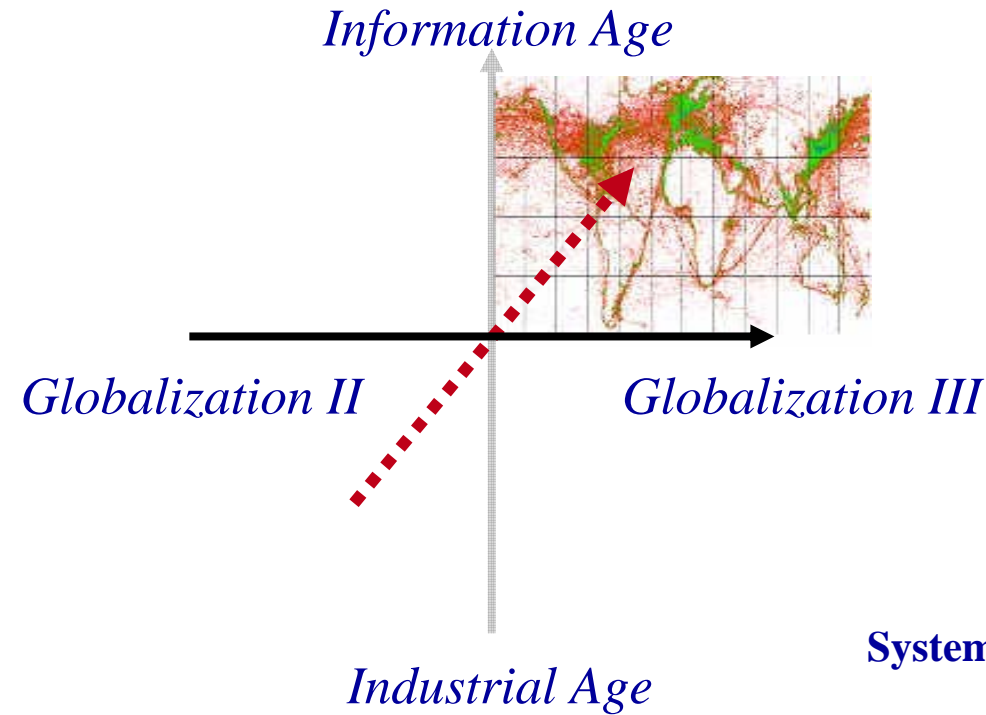


Global Trends...Threats

...Strategic Response

Strategic Capabilities:

- *More preventative - less punitive*
- *Achieve unambiguous warning earlier*
- *More Special Operations like characteristics*
- *An intel / surveillance-based force*
- *Interoperability/interdependence*
- *Coping with Systems Perturbations*



System	----- [Great Power War?] -----			
State	Political Ideology	Hated Dictator	Hated Dictator w/Nukes	Nuclear Nationalists
Individual	Narco-terrorists	Regional Terrorists	International Terrorists	SEI*

* Super-Empowered Individual



Top Level Issues

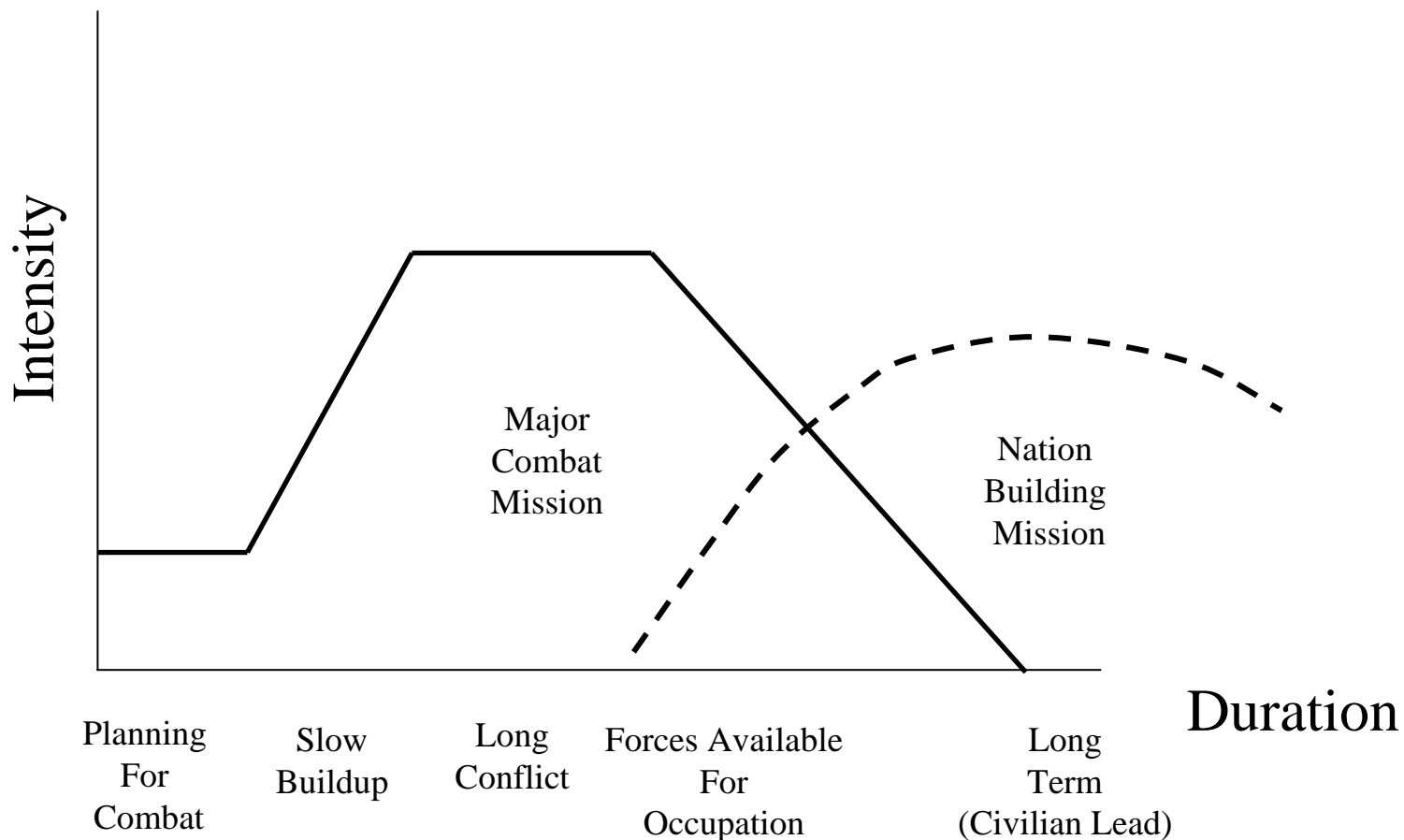
...Culture: Attitudes, Values, Beliefs





The Stabilization Mission Gap

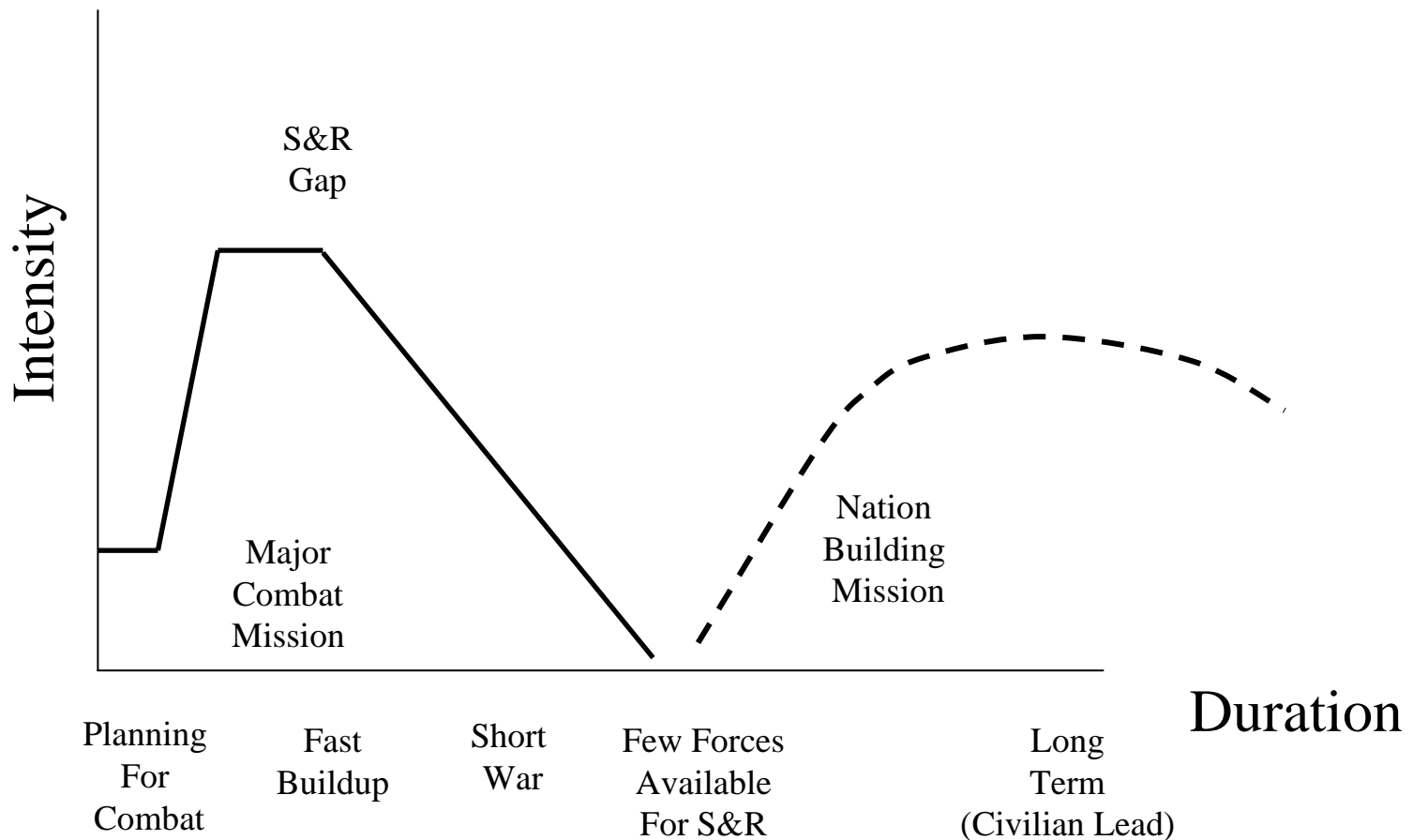
... Traditional Model





The Stabilization Mission Gap

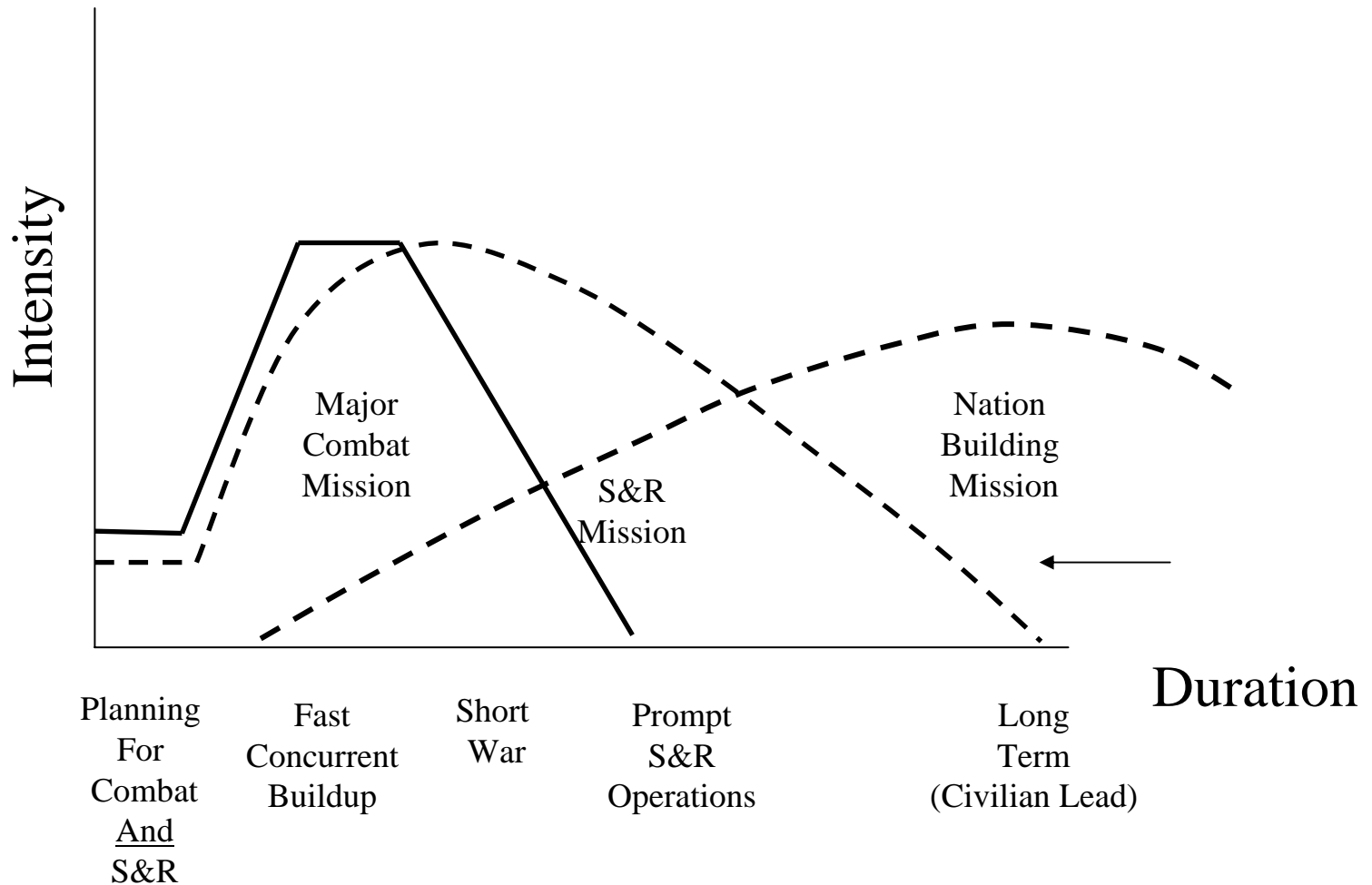
... New Challenges





The Stabilization Mission Gap

... Transformed S&R Capability





Informing Transformation

...Transactions vs. Resources

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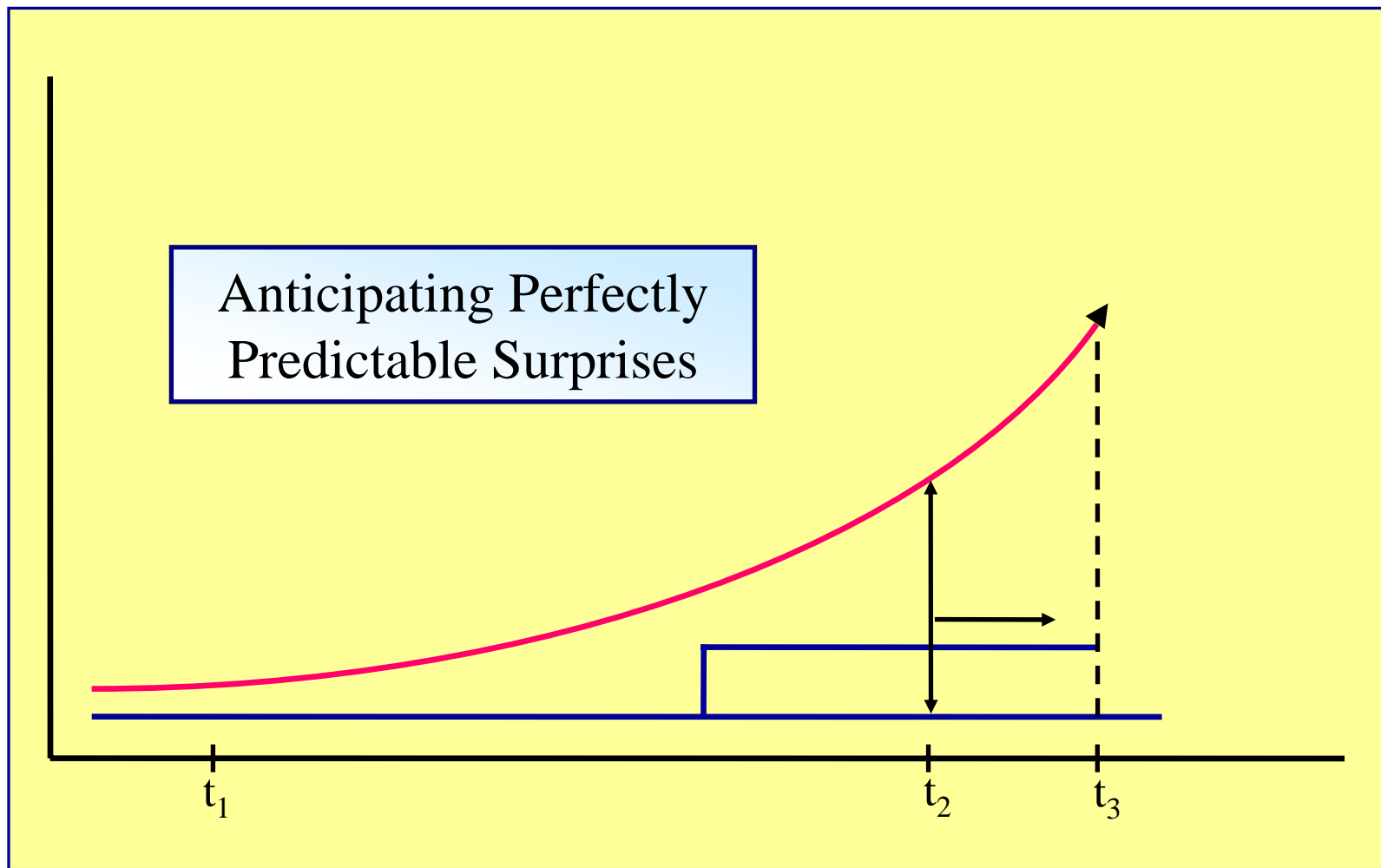
Anticipating Perfectly
Predictable Surprises

t_1

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t_3

T
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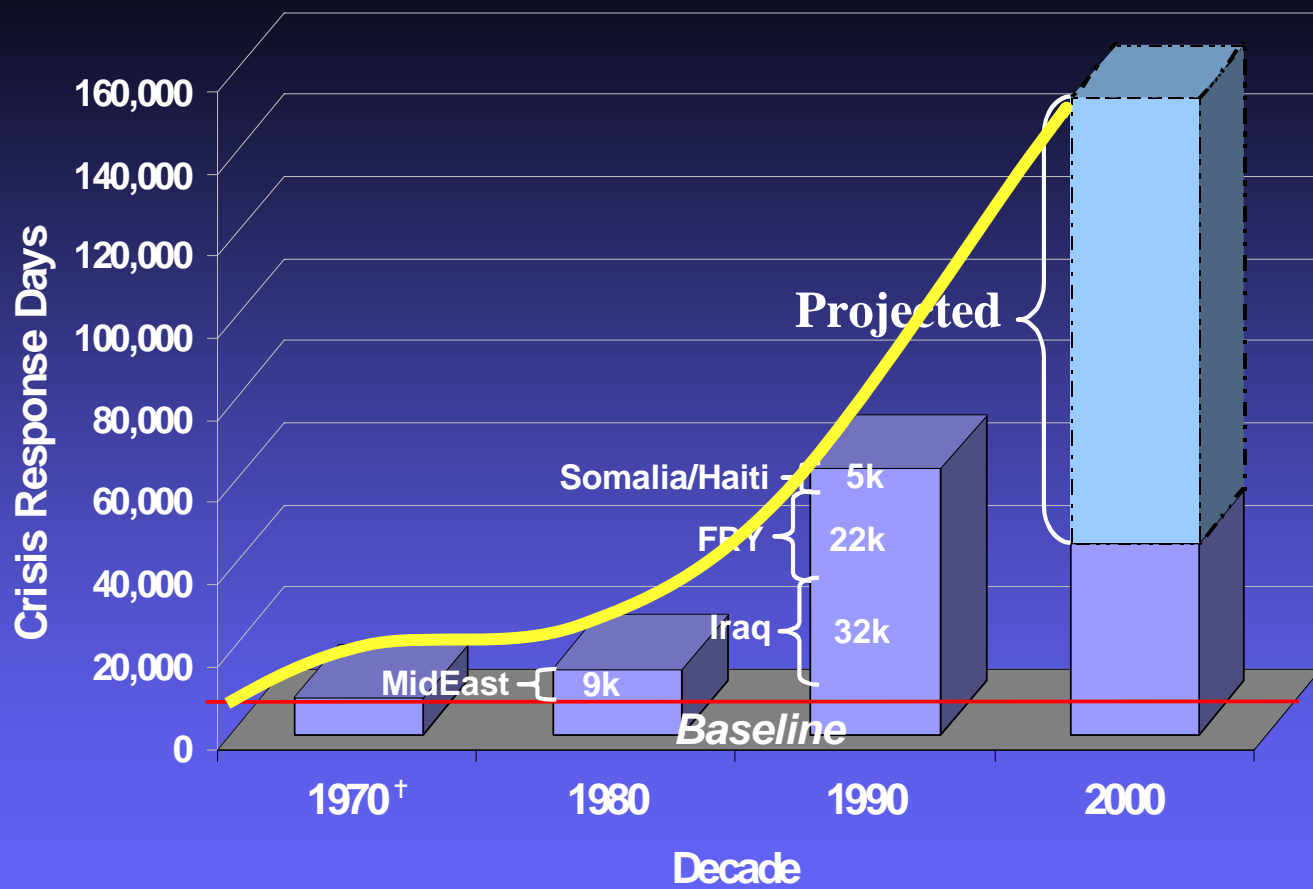




Global Trends and Implications

Policy Choices:

- *Engagement Policy*
- *Substitution of Capital for Labor*
- *Civil Component of National Security*
- *Allied / International Component*



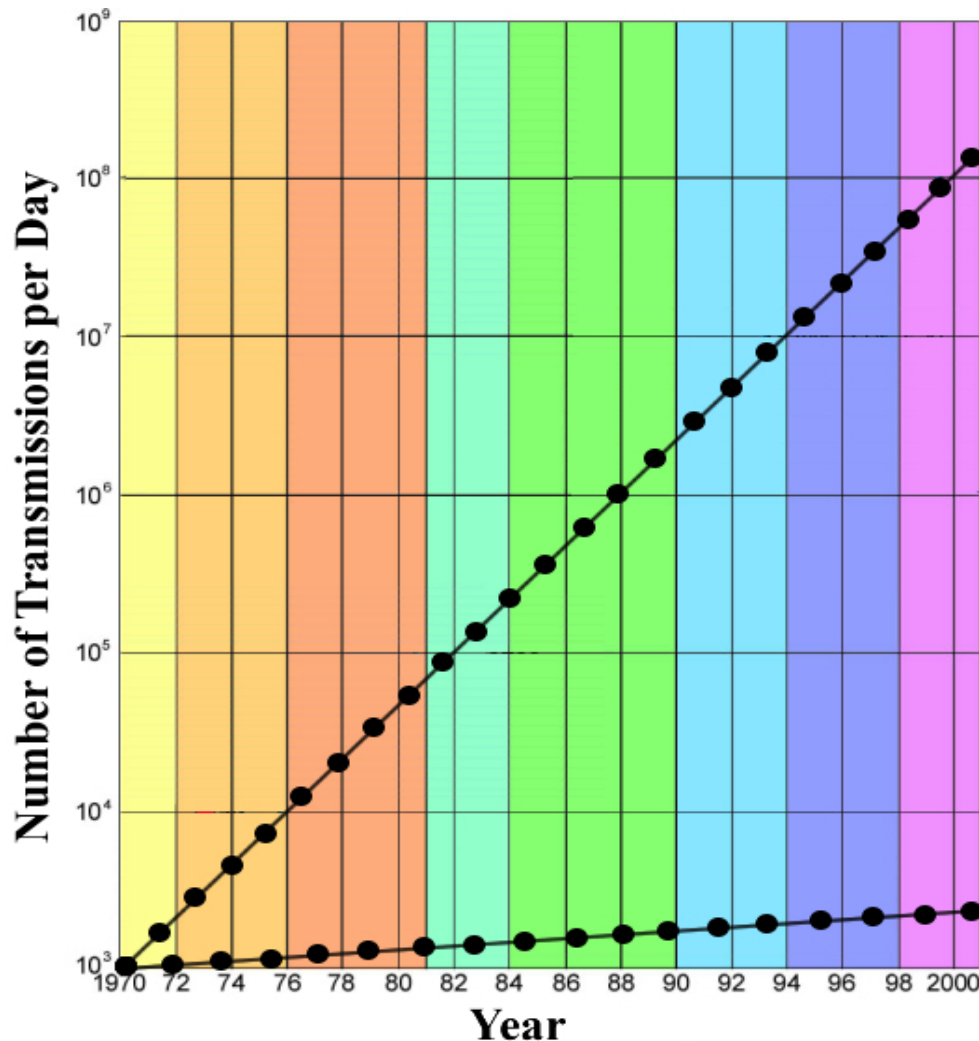
[†] Excludes Vietnam War

^{*} Total number of response days for all operations by Army, Navy, Air Force and Marines



The Collection – Analysis Gap

...Managing the Inevitable



Policy Choices:

- *Automate Triage*
- *Automate Analysis*
- *We all become analysts*



Military Response to Information Age: Network Centric Warfare

Translates an Information Advantage
into a decisive Warfighting Advantage

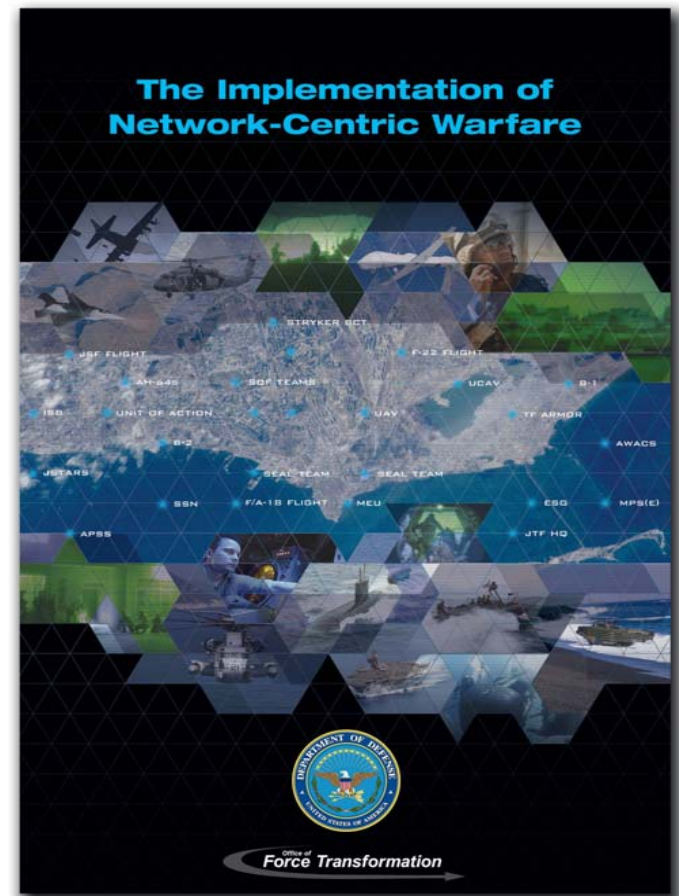
Information Advantage - enabled by the
robust networking of well informed
geographically dispersed forces

Characterized by:

- Information sharing
- Shared situational awareness
- Knowledge of commander's intent

Warfighting Advantage - exploits behavioral change and new doctrine to enable:

- Self-synchronization
- Speed of command
- Increased combat power



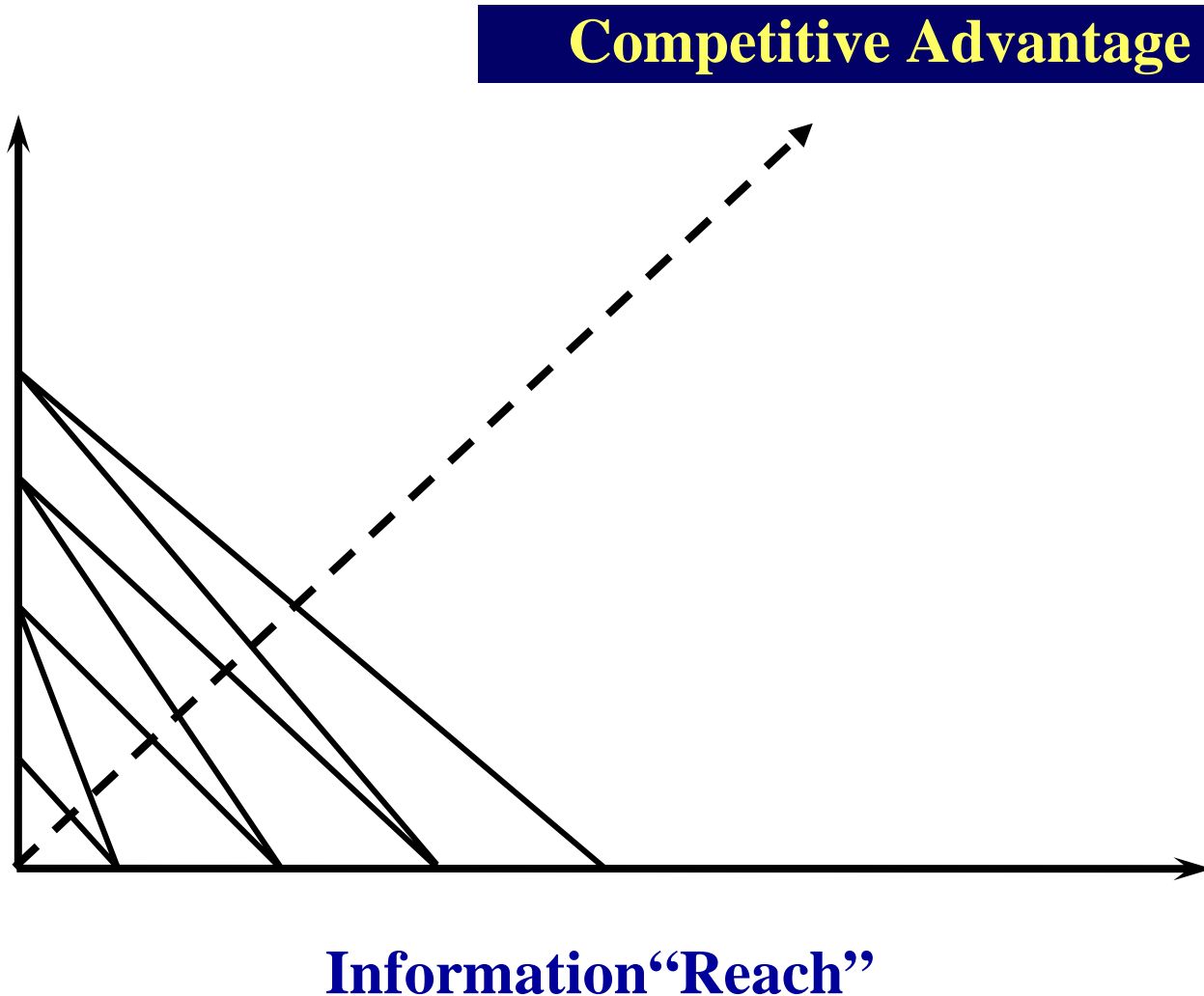
Information Sharing is a New Source of Power



Learning Rate

Information “Richness”

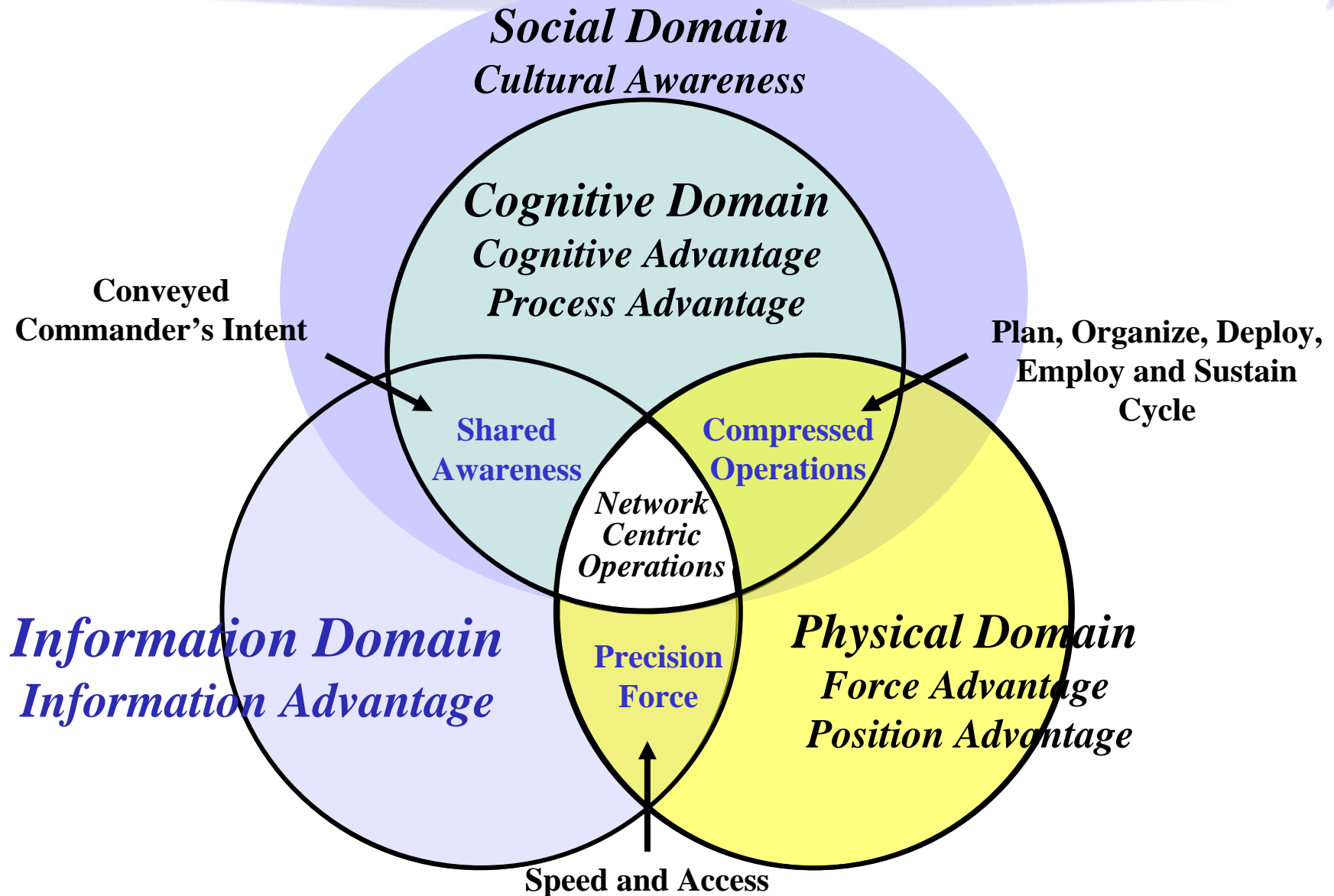
- Content
- Accuracy
- Timeliness
- Relevance





Competing in the Information-Age

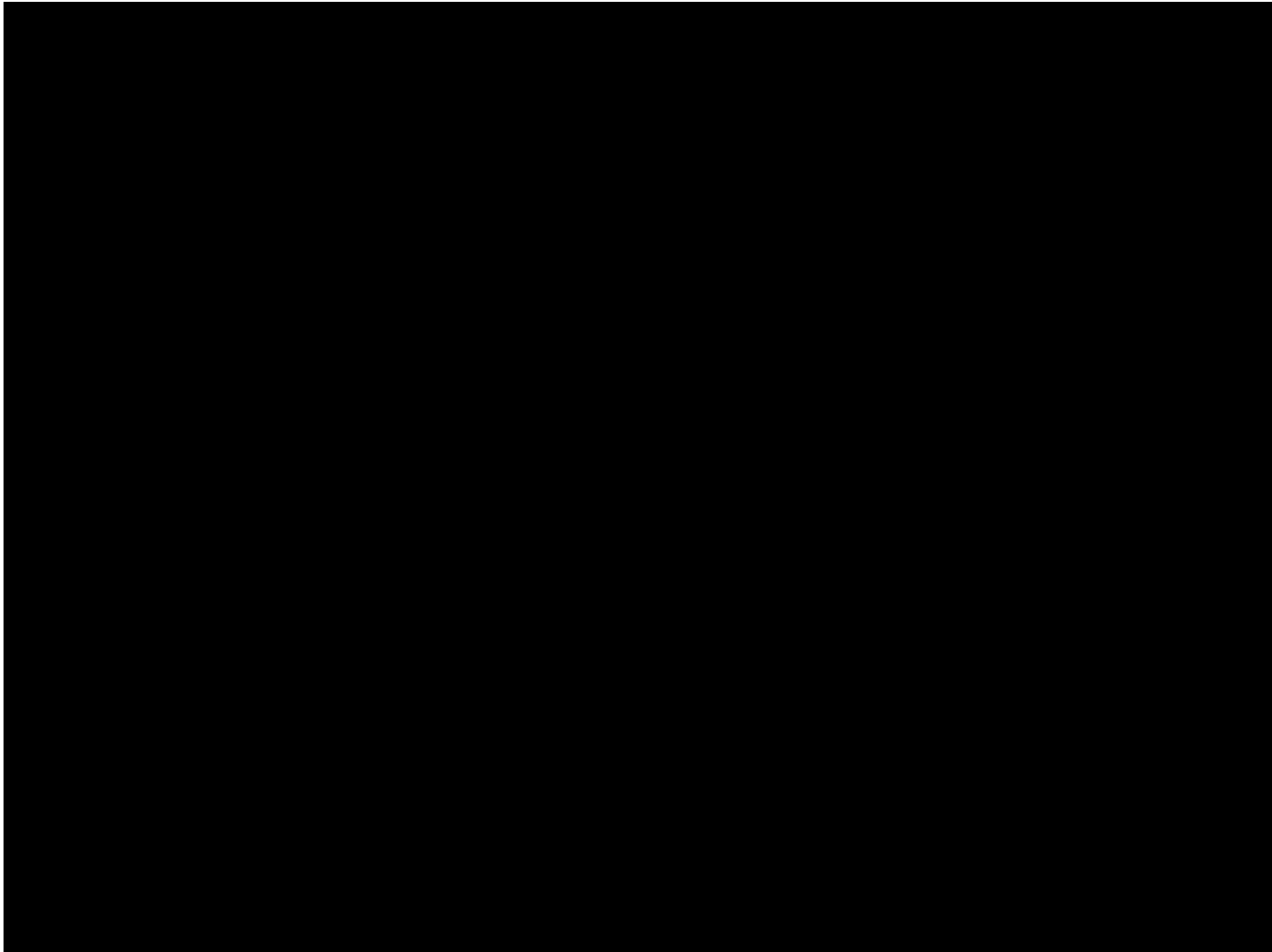
...The Power of Network-Centric Operations





Shared Awareness

...The new competitive advantage



Source: New York Times Television – The Perfect War, 2004

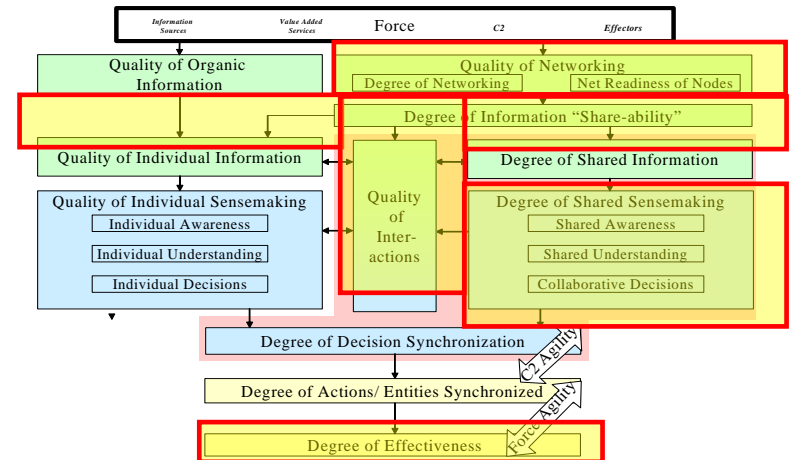


Stryker Brigade Case Study

Scenario

- SBCT attack on Shughart-Gordon
- Certification Exercise (CERTEx) at Joint Readiness Training Center, May 2003

Area of Focus



Hypotheses

- Stryker Bde NCO capabilities provide significant information and decision superiority and increase force effectiveness and are a source of combat power

Findings

- Friendly :Enemy casualty ratio decreased from 10:1 to 1:1
- Increase in Individual/shared information quality from about 10% to ~80%
- Acceleration of speed of command from 24 to 3 hours in key engagement
- Bottom line result: allowed commander ability to control the speed of command



Identify Issues of Regret

... *Candidates for Action Now*

Warfare Elements

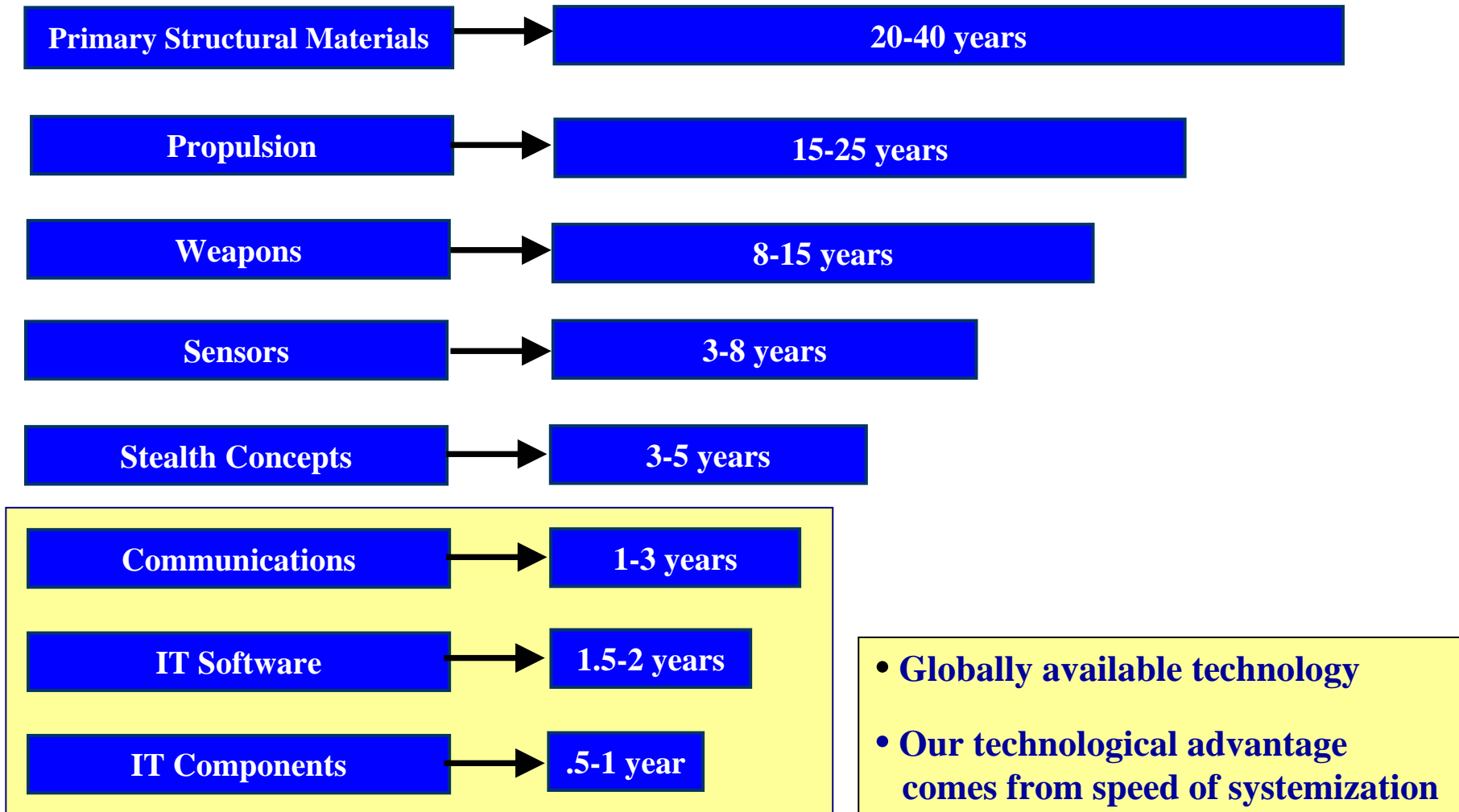
- *Fire* – non-lethals, directed energy, redirected energy
- *Maneuver* – seabasing, vertical battlefield, lift for operational maneuver
- *Protection* – urban operations, “biomedical countermeasures” cycle time
- *C2&C* – joint interdependency vs. interoperability
- *ISR* – demand-centered intelligence, tactically responsive space
- *Logistics* – joint demand-centered logistics

Risk Management (*creating on-ramps*)

- *Joint concept development & experimentation* – short cycle time / rapid iteration, concept-based / technology-enabled
- *Joint training* – live / virtual / constructive / distributed
- *People* – culture and organizations



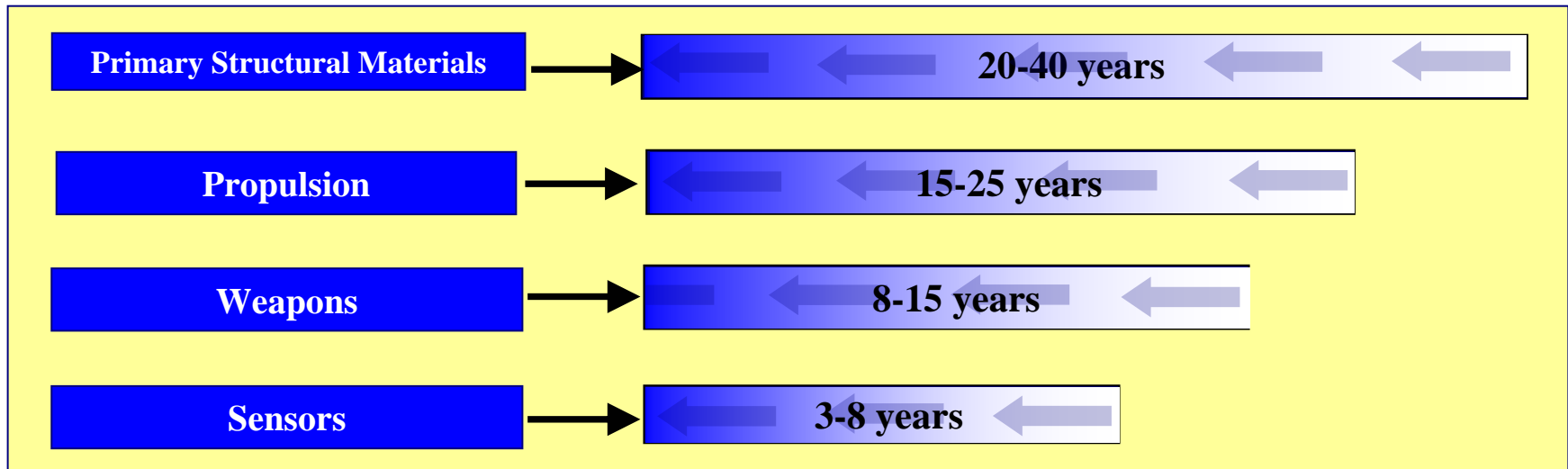
Technology Trends and Cycles





Technology Trends and Cycles

...New Opportunities



Stealth Concepts → **3-5 years**

Communications → **1-3 years**

IT Software → **1.5-2 years**

IT Components → **.5-1 year**

- **Historical Opportunity**
- **Time and Cost Compression**

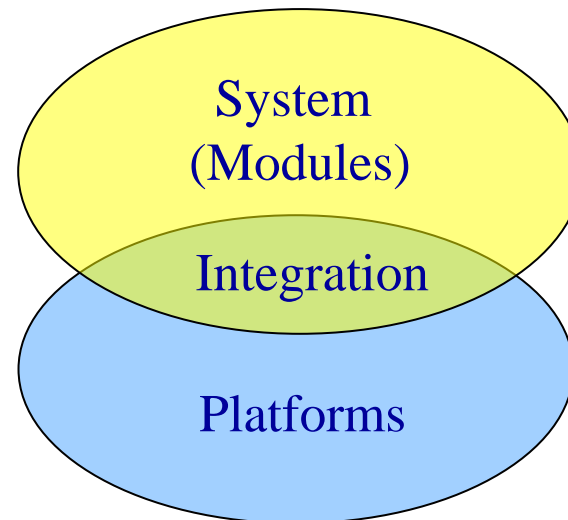


Alternative Architectures

... Characteristics

Focus in designing alternative architectures:

- Low unit cost
- Modularity
- Numbers
- Speed
- Networking
- Sensing
- Innovative designs
- Mass Customization



Preserve Strategic Advantage: innovation & the breadth, depth and diversity of the industrial base

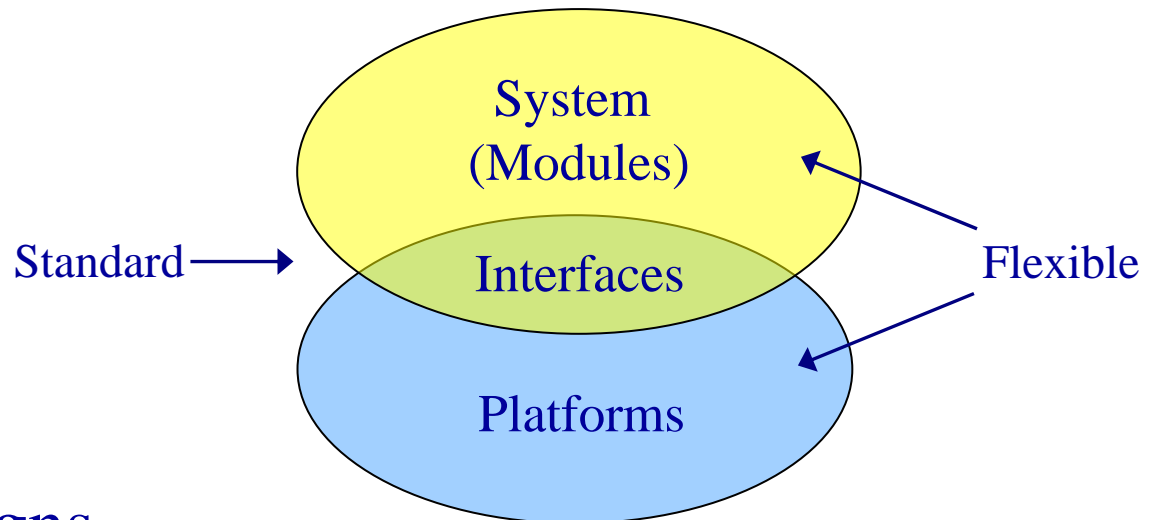


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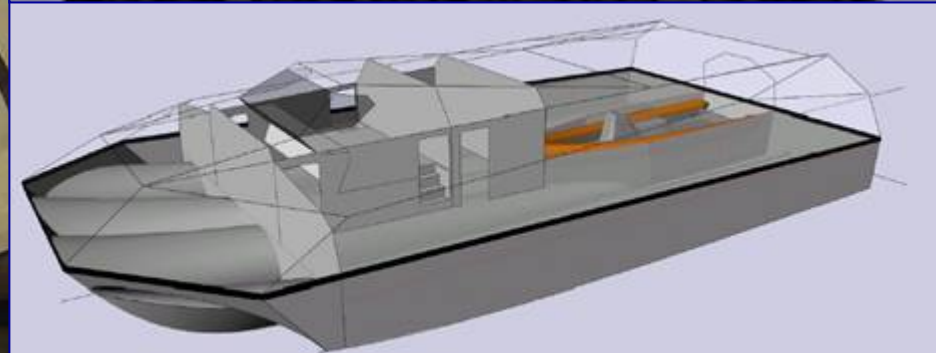
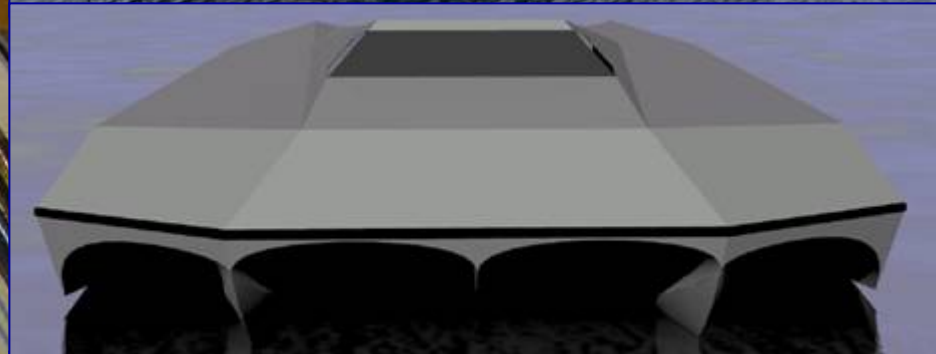
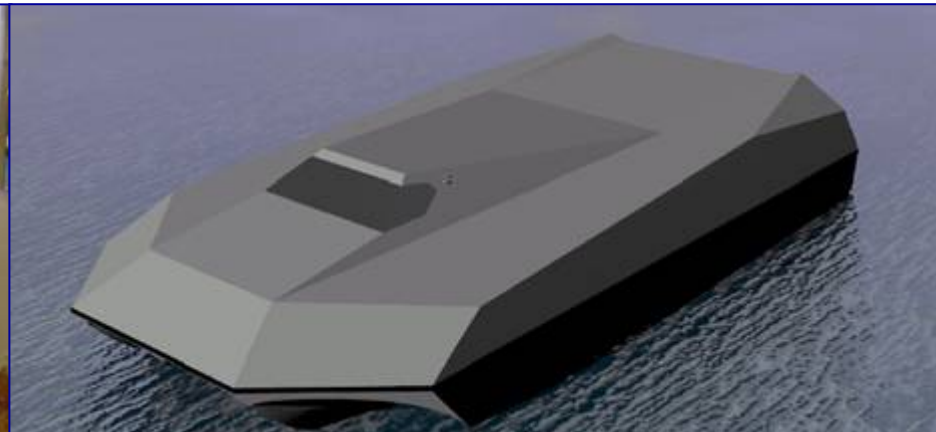
High Speed at Sea

M-80

LOA	80'-0"
Beam	40'-0"
Tunnel Width (4)	5'-0"
Draft (static)	2'-4"
Displacement	67 MT
Payload	15 MT
Fuel Load	10 MT
Classification	ABS
Main Engines	4 x 1650HP C-30 Caterpillars
Surface Piercing Propellers	4
Speed	Max @ full load 50-55 knots
Range @ full load & max speed	500 NM
HP Required (total)	6200hp
Clear Height	15'-0"

Payloads 43% of Displacement

- 11-M RIB or equivalent
- UAVs
- 15 personnel





Stiletto





Project “Sheriff”

...Controlling the Engagement Timelines

The Capabilities

- “Speed-of-light Sensing
- Networked
- Lethal/Non-Lethal Options
- Active/Passive Options
- Kinetic/Non-Kinetic Options
- Survivability



The Technology

- Compact Active-Denial Technology
- Phaselator High-Power Direction Hailer
- Vector-Beam High-Power
White/IR Spot Light
- Counter Improvised
Explosive Device (IED)
- Active Protection
- Counter Sniper
- Rapid-Fire Kinetic Weapon
- Multi-Spectral Sensor Suite
- Armor Protection
- Integrated Electronic Warfare Suite
- Net-Centric Technology



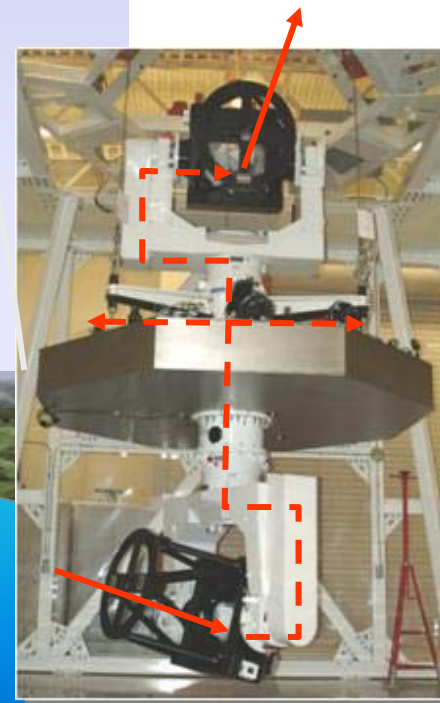
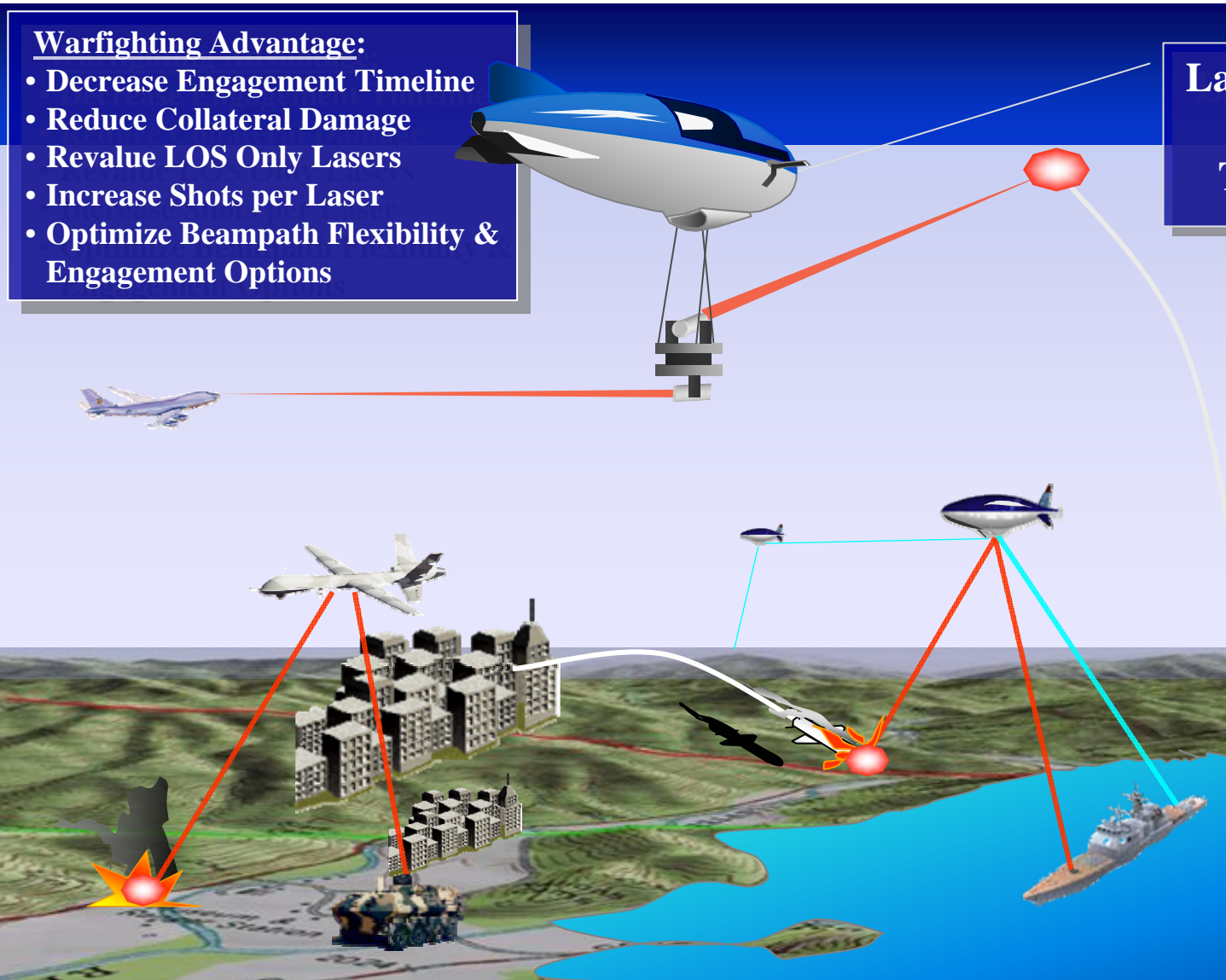
Re-Directed Energy

... Concept Description

Warfighting Advantage:

- Decrease Engagement Timeline
- Reduce Collateral Damage
- Revalue LOS Only Lasers
- Increase Shots per Laser
- Optimize Beampath Flexibility & Engagement Options

**Laser – Relay Mirror –
Air Vehicle
Technology Pairing**





New Logic and Metrics

- Achieve higher learning rates

Co-evolve concepts, capabilities and processes

Continuous adaptive acquisition and experimentation

- Employ higher transaction rates

Faster cycle times

Speed of information and operational mobility

- Create and preserve options

Technology on-ramps

Broaden capabilities base

Mass customization

- Create overmatching complexity

Scalable

The small the fast and the many



BACK-UP



Transforming National Security

Information Age

“A Future Worth Creating”

Globalization II

Globalization III

Vision: Broad and Sustained Competitive Advantage

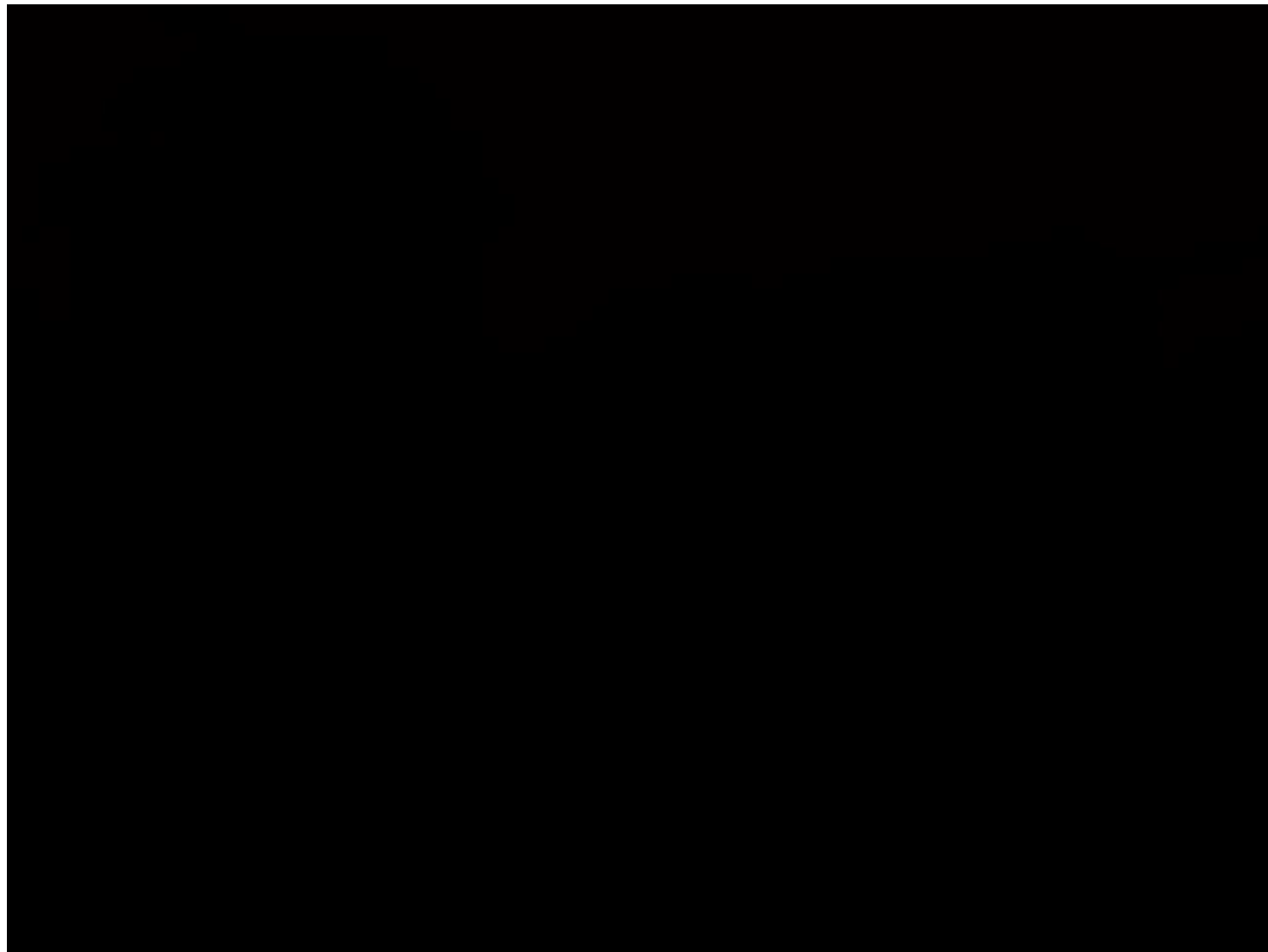
- *Strategy*
- *Capabilities*
- *Cost/Metrics*

Industrial Age

*Terry J. Pudas
Acting Director, Force Transformation
25 January, 2006*



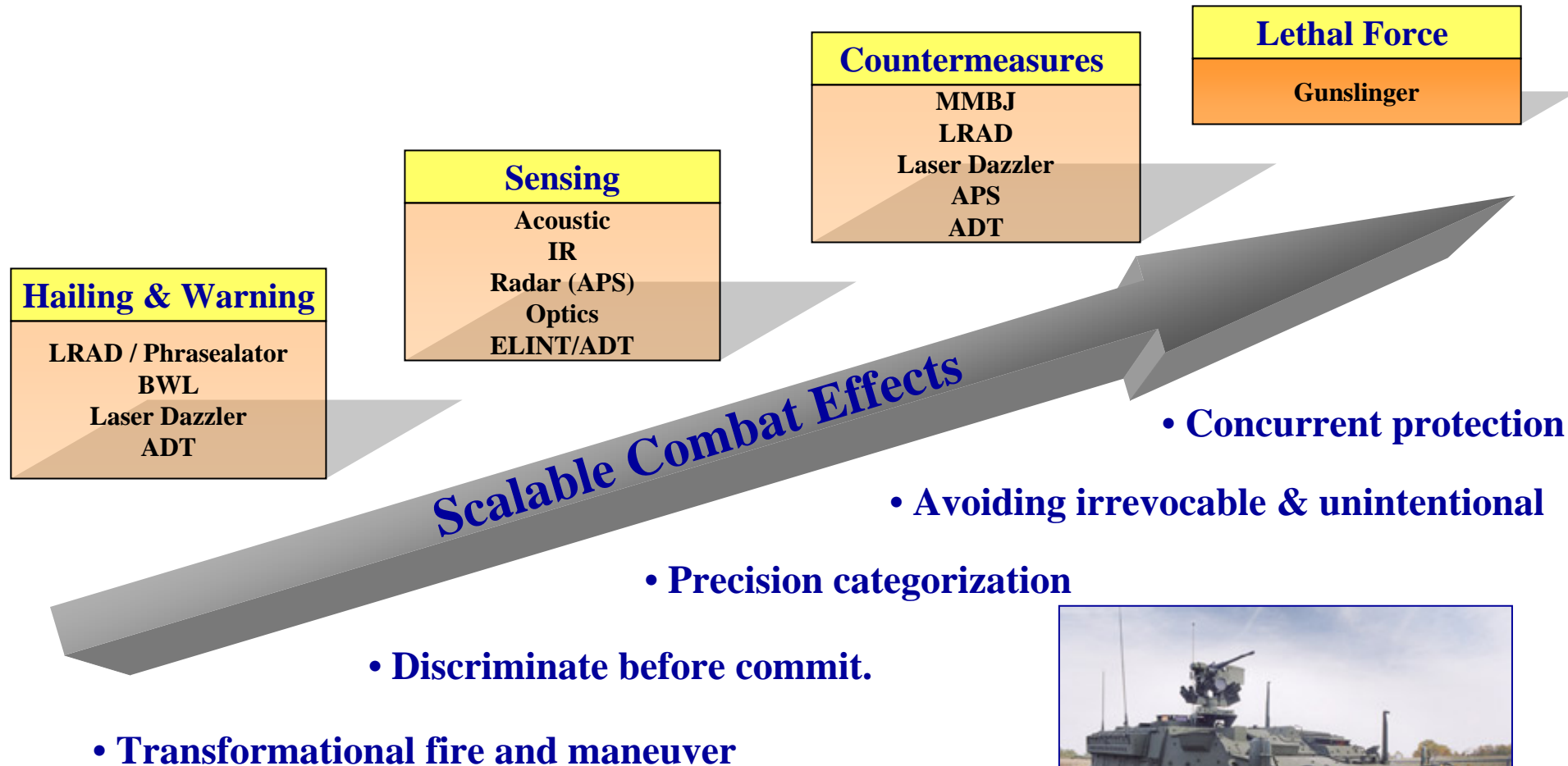
Full Spectrum Effects Platform





Full-Spectrum Effects Platform

'Sheriff' ...non-lethal enablers of lethal force





Non-Lethal and Directed Energy

(CNN) – “Law enforcement officers were questioning a Parsippany, New Jersey, man who they say may have pointed a laser beam at an airborne police helicopter Friday night and a Cessna aircraft two nights before, said a spokesman for the Port Authority of New York and New Jersey.” 12/31/04

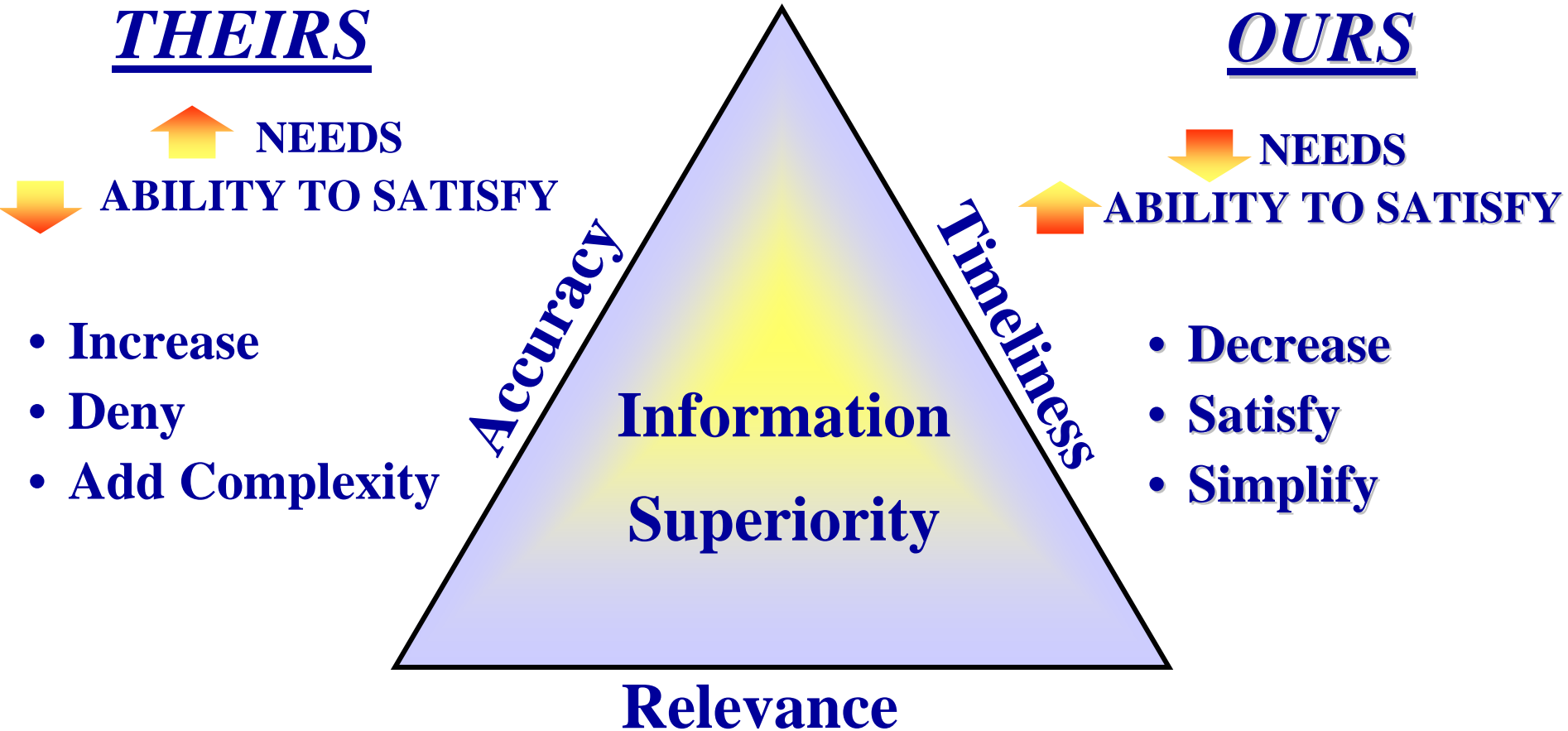
MAHE, Seychelles (AP) – “The crew of a cruise ship attacked by pirates off the coast of Somalia used a sonic weapon to help ward off the attackers, the Miami-based Seabourn Cruise Line said Monday.” 11/8/05

“More than 400 incidents involving the dangerous practice of shining laser light into aircraft have been reported since 1990, U.S. Department of Transportation Secretary Norman Mineta said at a January 2005 press conference in Oklahoma City.” 1/5/06



Competitive Advantage

...New Sources of Power



“We need a force which is designed and capable of fighting first for information superiority.”



Transforming National Security

War is more than combat

and...

Combat is more than shooting



Concept/Technology Initiatives

- Operationally Responsive Space-Based System



OFT Teamed With

AF Space Command, AFRL, NRL, NRO, Johns Hopkins Applied Physics Lab, NASA, MIT Lincoln Labs

- Full-Spectrum Effects Platform: Project “Sheriff”



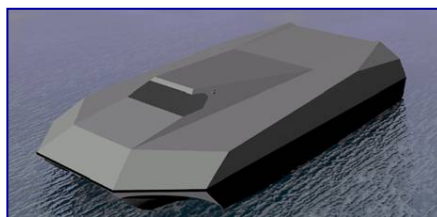
Army AMO/CCS, US Army Futures Center, MCWL, NSWC-DD

- Tactical Re-Directed Energy



Air Force Research Lab/DE/ DDR&E, IDA (JAWP)

- Advanced Technology Craft Prototype Development & Experimentation



**NUWC / NAVSEA
Combatant Craft Division,
Naval Undersea Warfare
Command / CCD, SOCOM,
Naval Postgraduate School**



Full-Spectrum Effects Platform

'Sheriff'...plan in action

Office of the Secretary of Defense

Force Transformation



Acoustics testing

- F-SEP Spiral 0 Integration Complete
- Testing at Dahlgren, Quantico and Aberdeen Dec -Feb '06.
- Infantry Center Test & Validation March – May '06.



APS Installation



F-SEP Spiral 0 Stryker 2 December 2005



Stiletto





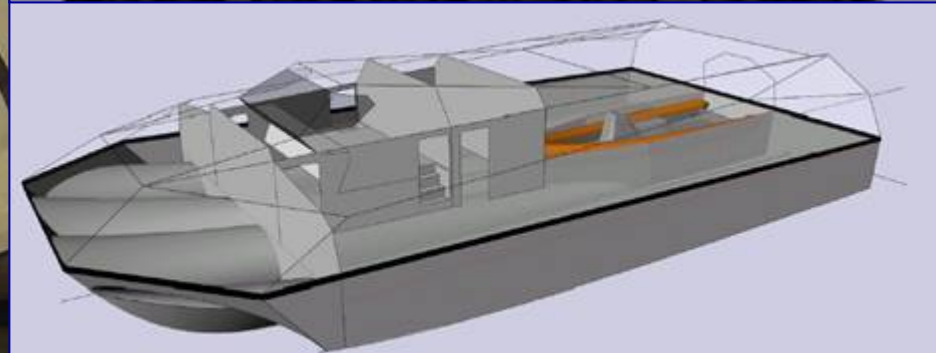
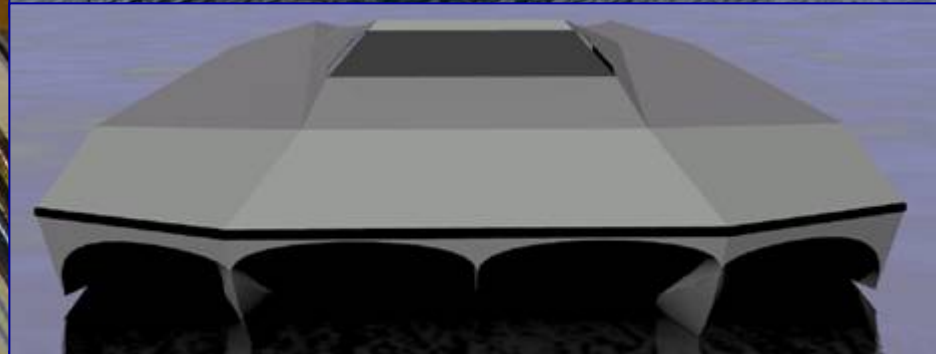
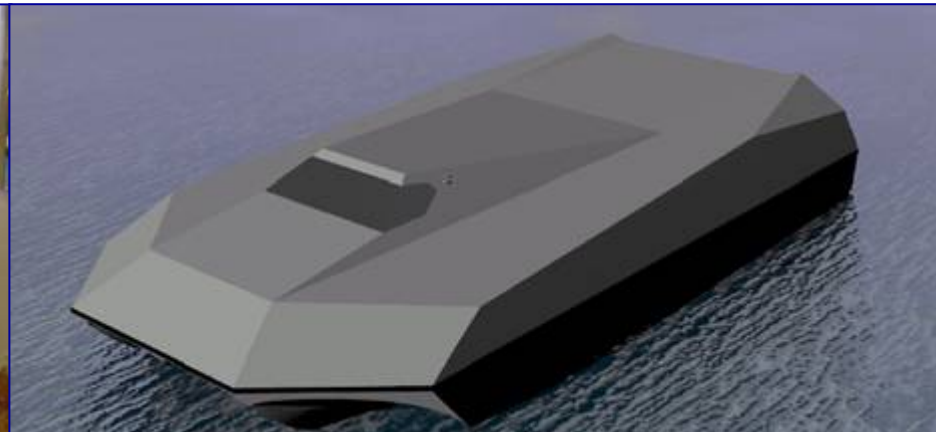
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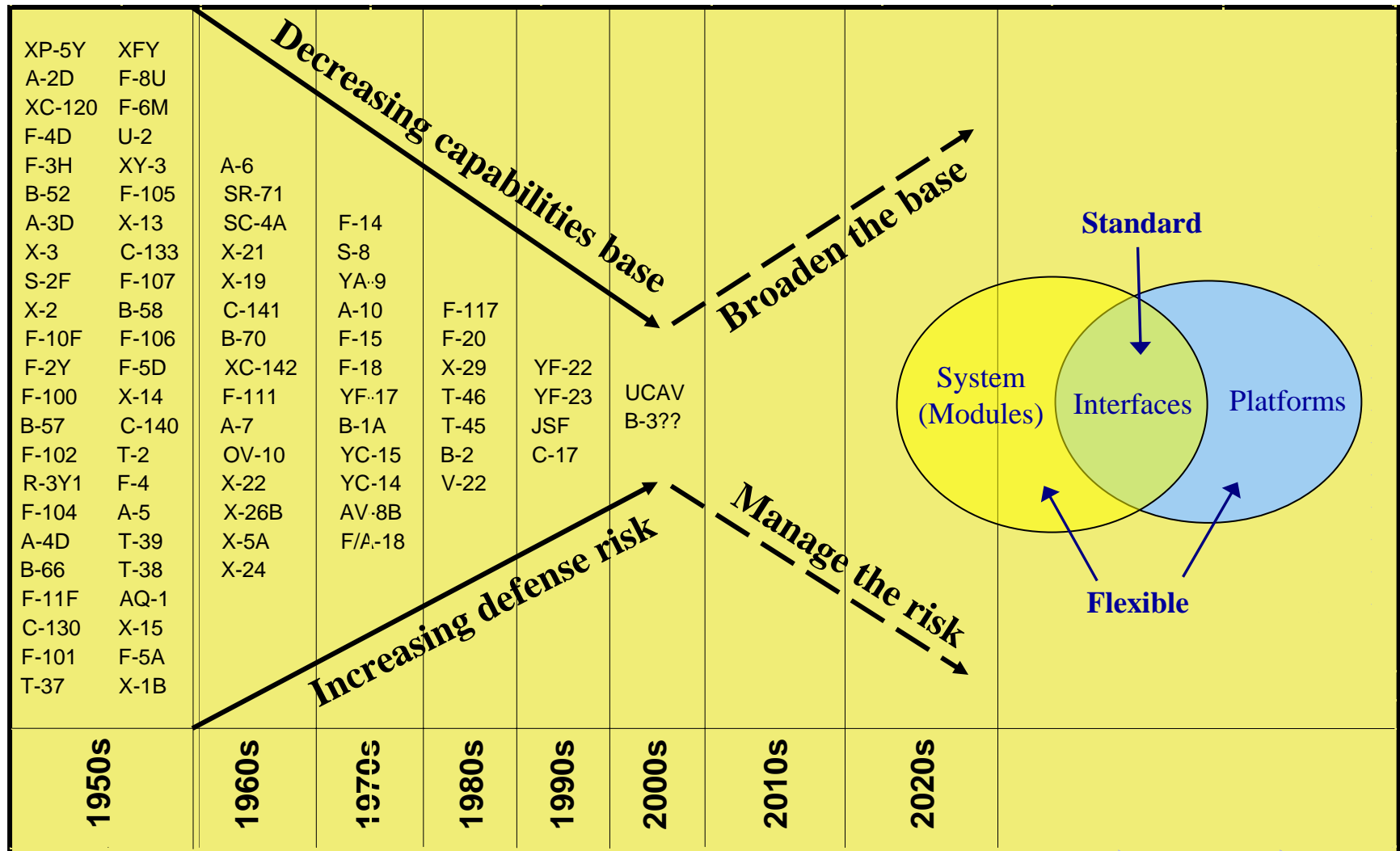
Payloads 43% of Displacement

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- 15 personnel



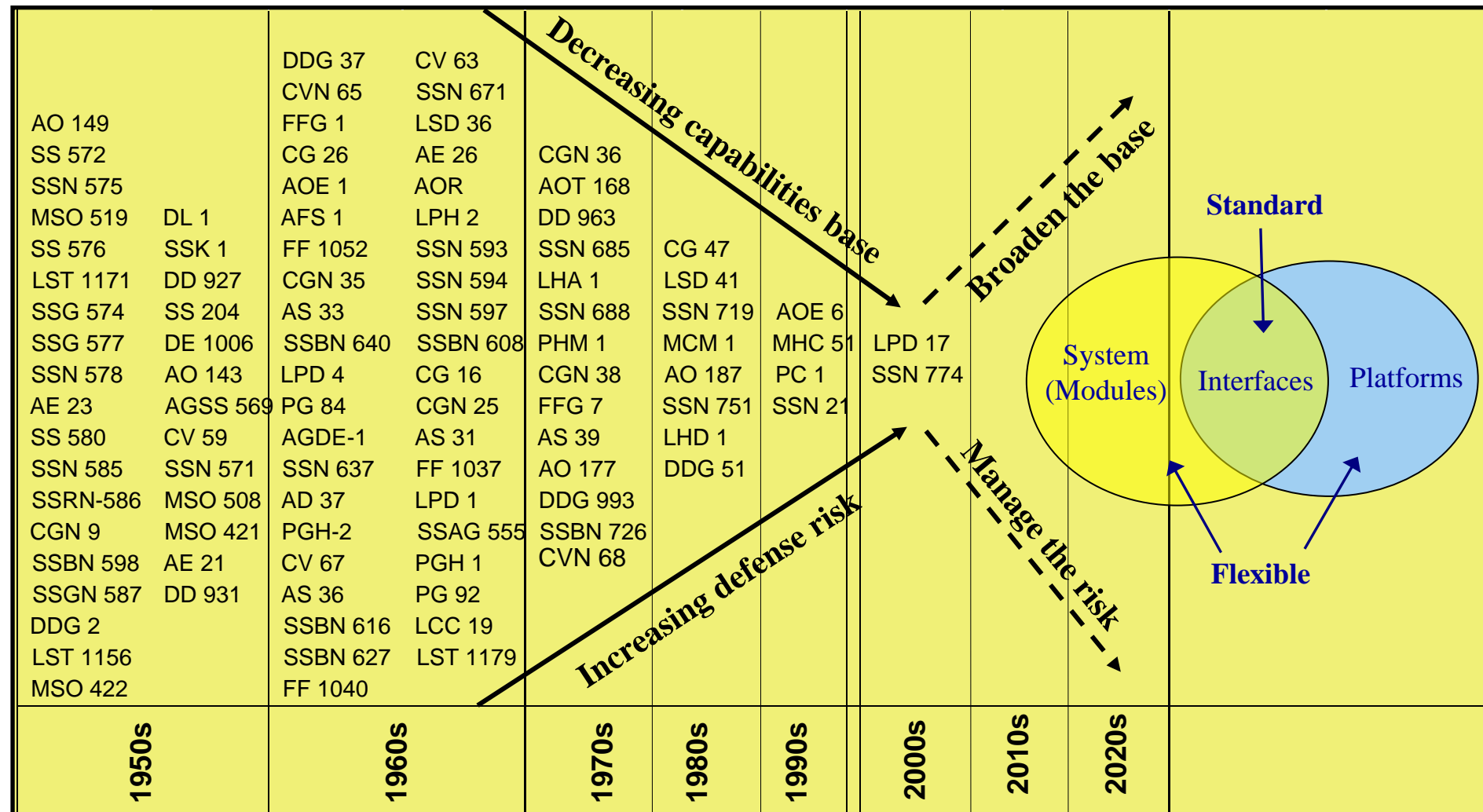


Aircraft Program Trends





Navy Program Trends



Based on date first ship in class was launched



Transforming Defense

... Characteristics of the Future Joint Force

This is the age of the small, the fast, and the many.

Small: Power and size are uncoupled

Fast: A shorter response with a faster rise time more precisely placed in time and space

Many: The power of the collective at lower cost over a larger area

Rebalance for the information age

“Demassification” through increased information fractions

Simplification through adaptive relocation of complexity & the human

Networked components vice integrated systems

Operations based on assured access, information superiority,
control of initial conditions and rates of change

A priori access to the domains of conflict

Secure a superior information position and convert it to a competitive advantage

Leverage the path dependency of conflict

Corporate change based on co-evolution and continuous
adaptive acquisition



New Logic and Metrics

...Competency

- Access

The ability to use military assets, both information and physical, at the best points of effect in hard-to-reach locations even when denial strategies are employed by the enemy;

- Speed

Minimization of response time from deliberate operational (or strategic) maneuver to stunning tactical swiftness;

- Distribution

The extent to which firepower, sensors, and other systems are spread over a diverse and geographically dispersed set of assets/platforms;

- Sensing

The ability to provide information with accuracy, timeliness and relevance, and especially to locate and track fleeting targets;

- Mobility

The ease and promptness by which military assets can be shifted from one physical location to another; and

- Networking

The extent to which military assets are connected together through information technology that assures shared awareness and information access.



Why Organization Matters

Organization

- Determines *command relationships*; career patterns and professional development
- Establishes *connectivity* between communications nodes;
- Provides *structures* for information exchange requirements



Weapons Employment Time Delay

Offense vs. Defense

Mobility vs. Shooters

Stealth vs. Sensors

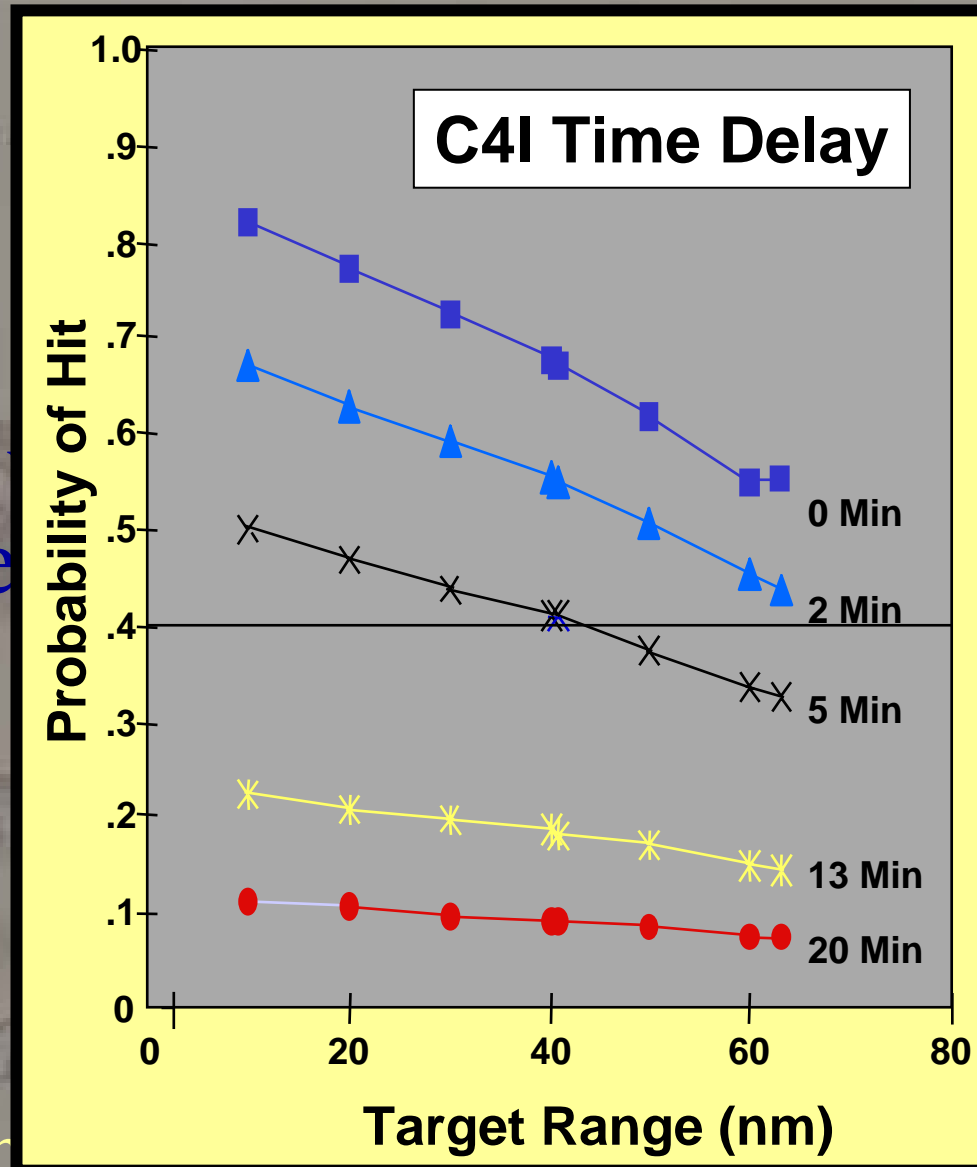
Envelope management
depth of battle

Stealth & Mobility vs.
Engagement Range
→

Speed, Time, Timing
→

Trimming for speed
→

Shorten sensor times Arch



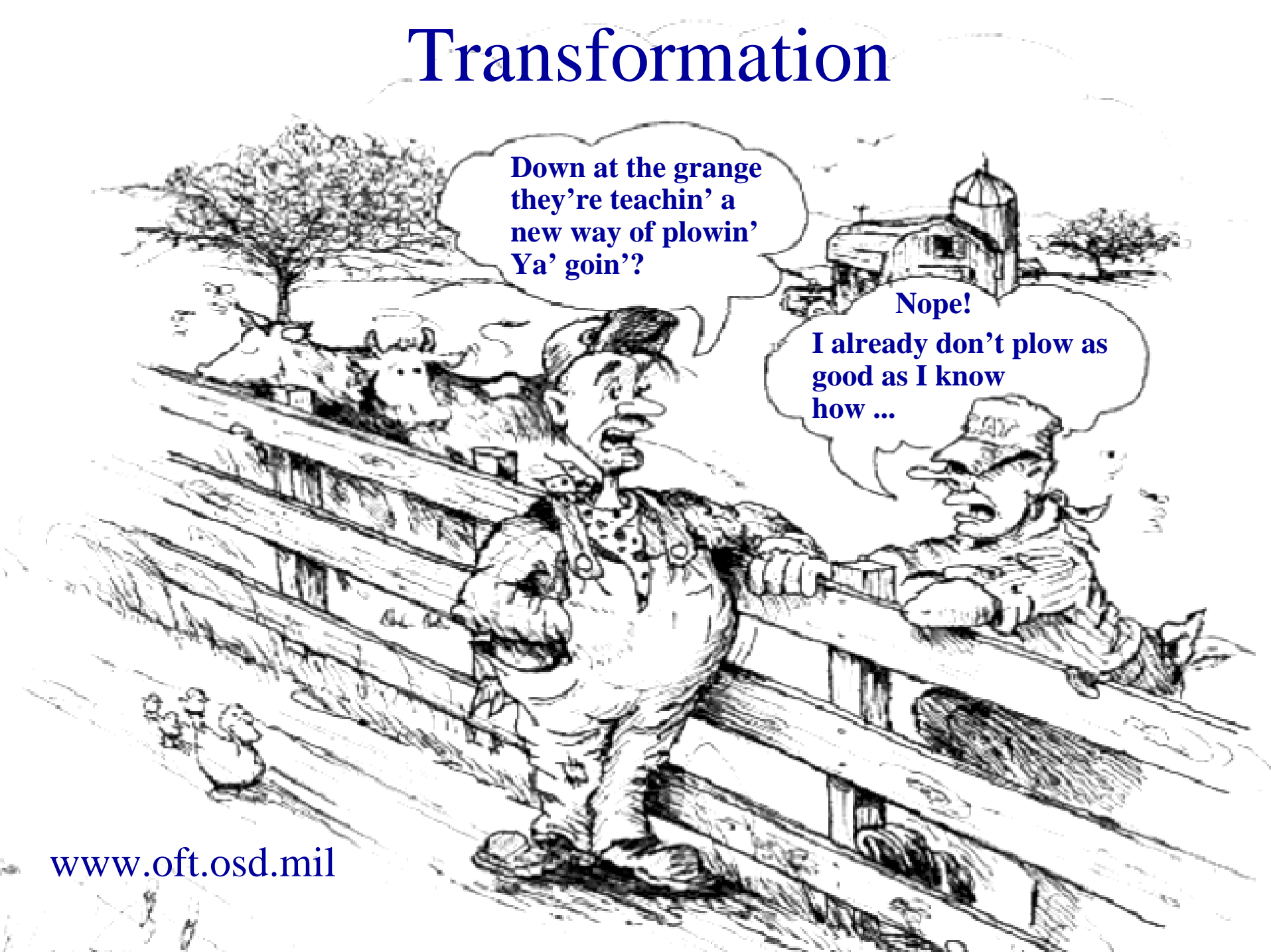


Western Iraq Case Study

...Key Findings to Date

- Western Iraq was the most “networked” theater of operations, operationally and tactically, in the history of warfare.
- Largest conventional & coalition SOF operation in the history of warfare.
- Largest scale use of tactical data-links in history of warfare.
- Only area of operation in Iraq where Blue Force Tracking information on SOF + conventional ground forces was provided via data link to fixed wing combat aircraft.
- Zero Fratricide: Only area of operations in Iraq where air-to-ground fratricide was eliminated

Transformation



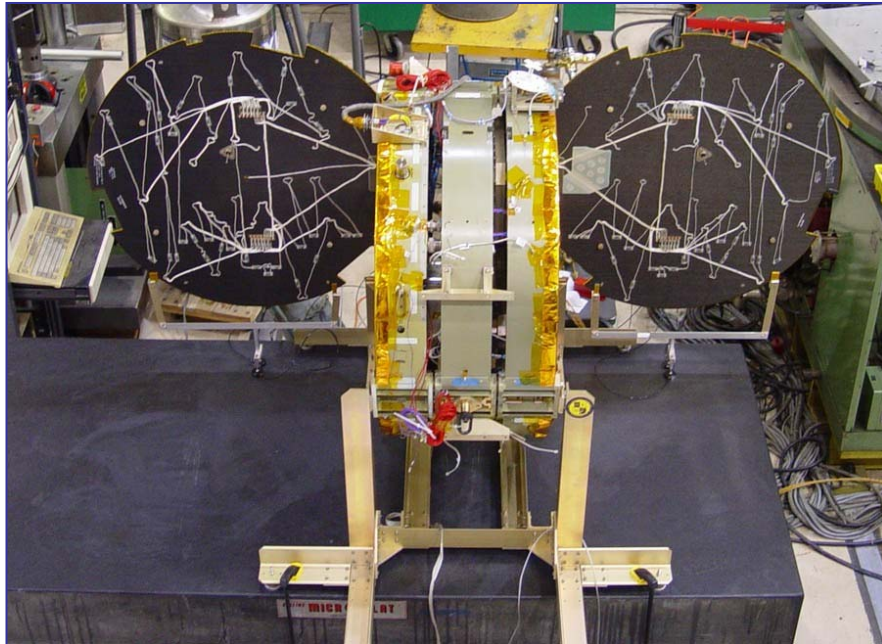
Down at the grange
they're teachin' a
new way of plowin'
Ya' goin'?

Nope!
I already don't plow as
good as I know
how ...



Operationally Responsive Space

...TACSAT 1



A capability on orbit within the planning time constraints of a major contingency

- Responsive
 - < 2 Yr concept to on-orbit capability
- Low Cost
 - Total cost of experiment less than \$15M including launch
- Experiment
 - UAV Components in Space
 - Space/Air Horizontal Integration
 - Designer Payloads
 - TCP/IP Based: SIPR Net Accessed
 - New commercial launch vehicle
- Operationally relevant capability
 - Integrated into Combatant Commanders
 - Exercises/Experiments
 - Time / Capability Trade Off



Key Barriers to Transformation

...Challenges

- Cultural barriers

Speed of understanding vs speed of doctrine

Values, attitudes and beliefs

- Physical barriers

Speed of mass (lift and mobility)

Speed of information (connectivity & interoperability)

- Fiscal barriers

Willingness and ability to devalue and devolve

Strategic approach to cost

- Process barriers

Transformation of the management of defense



Strategic Approach to Cost

Key Elements

- *Decrease operational costs*
- *Achieve better ROI for less*
- *Broaden the capabilities base*
- *Create and preserve future options*
- *Manage divestiture*
- *Transform non-discretionary areas*
- *Impose cost to adversary*
- *Develop counter-cost imposing strategies*

New metrics create opportunities for new cost dynamics



Transforming Defense

... Corporate Strategy

Part I: Continuous small steps

Sustaining

Evolutionary changes

Stay on the local maximum

Part II: Many medium jumps

Explore and expand the local region

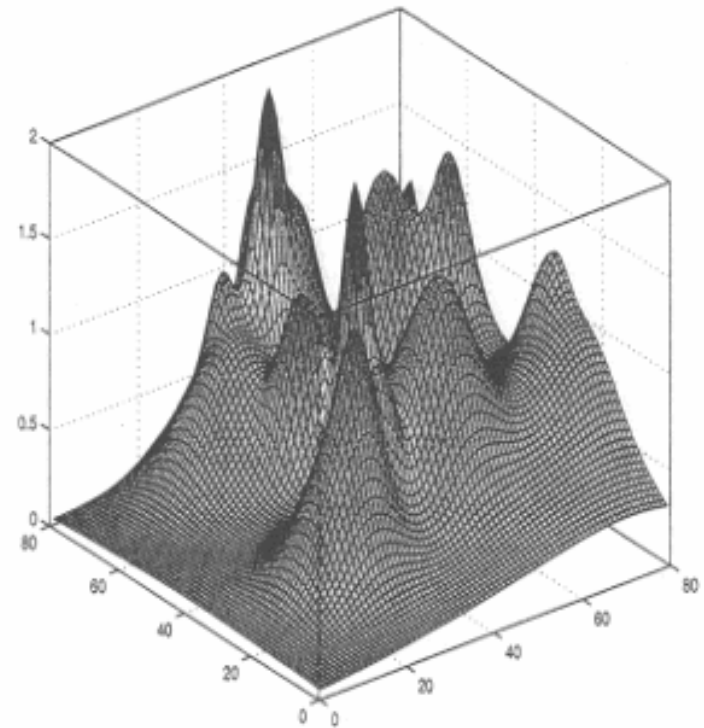
New doctrine / organization / systems

Part III: A few big bets

Could change DoD

Change the world

Create a new game with new rules



“If you are not making any big bets you are a fixed strategic target and at risk.”



Non-Lethal Weapons

...Summary

1. **Transformational? - Yes**
 - New strategic context (expanded competition-moral principle)
 - Broadens the capabilities base
 - Expanded threat context
 - Allows us to do things we cannot currently do
2. **Do we have the technical ability to create a NLW capability? - Yes - If we choose to do so**
 - Demonstrated prototypes currently exist
 - Law enforcement already using
 - Potential NLW utility from ongoing S&T initiatives
3. **Do NLWs have military utility - Unequivocally Yes**
 - Need identified and requested in Kosovo
 - Examples of requirement in Iraq
4. **Are there impediments to creating/employing a NLW capability? - Yes**
 - Structural-Joint S&T
 - Acquisition authority
 - Executive agent/Program office
 - Legal/policy-Reexamine the root decisions upon which the policies and treaties were created/interpreted
 - Cultural-Warrior+Enforcer+"Systems Administrator"
 - Create a constabulary capability (stability and reconstruction)

War is more than combat and combat is more than shooting



Broaden the Base?

“If the only person that builds spacecraft for the government is Air Force Space Command, and I go to that warehouse for every product, there is not a lot of competition. There are a lot of well-intending, energetic people, but there is not a lot of competition.”

Gen. James E. Cartwright
Commander, U.S. Strategic Command



New Design Principles

- Capabilities are decoupled from platform
- Power and survivability have been decoupled from size
- Information has been substituted for mass
- Mass customization delivers greater value than mass production
- Networked components outperform integrated systems



Technology

...Opportunities and Payoff

Composites Materials

Innovative designs

Networking

Information for mass

Distributed capabilities

Proximate netted sensors

Directed and redirected energy

Robotics

Increased

Speed

Survivability

Sea keeping

Payload fraction

Dispersion

Shared awareness

Lethality

Tactical stability

Decreased

Life cycle cost

Procurement cost

Vulnerability

Manning

Structural mass

Infrastructure



Approaches to Logistics

Mass-Based



- **More is better**
- **Mountains of stuff measured in days of supply**
- **Uses massive inventory to hedge against uncertainty in demand and supply**
- **Mass begets mass and slows everything down**

Prime Metric: Days of supply

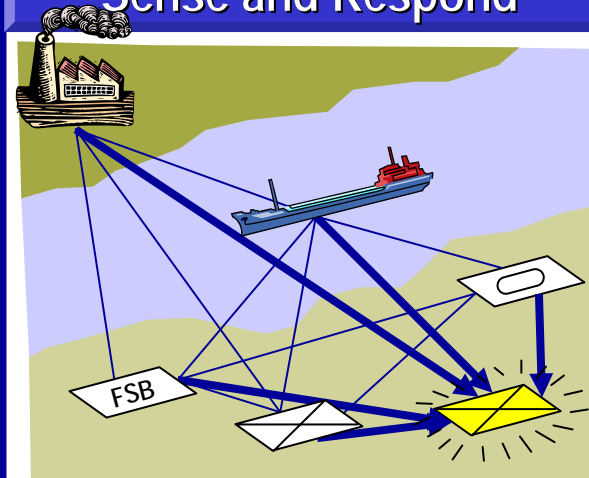
Just-in-Time



- **On-time is better**
- **Inventory is reduced to a minimum and kept moving**
- **Uses precise demand prediction and static optimization to purge uncertainty**
- **Works great ... except when it doesn't**

Prime Metric: Flow Time

Sense and Respond



- **Agile is better**
- **Inventory is dynamically positioned throughout**
- **Uses transportation flexibility and robust IT to handle uncertainty**
- **Initial S&R models look promising**

Prime Metric: Speed & Quality of Effects



Transforming Defense

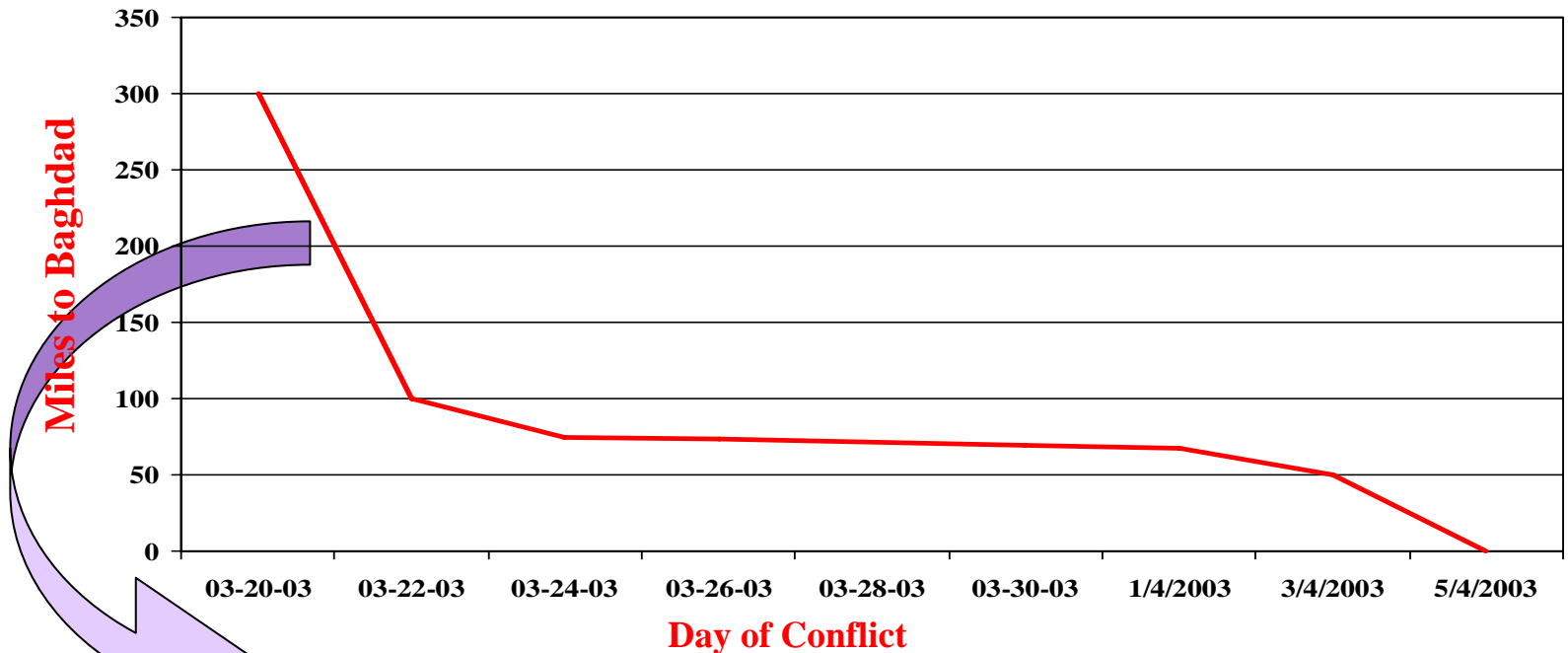
... General Observations

The Emerging American Military:

- *More expeditionary (including lighter, more lethal)*
- *More networked (more interoperability at the JTF level)*
- *Designed to leverage the exterior positions (precision from distance as sensors move in)*
- *Leverages increasingly persistent ISR*
- *Tighter sensor-shooter timelines (sensing, C2, fly-out)*
- *Values Information Superiority (information operations)*
- *Expanded unmanned capabilities
(UAV, UCAV, UUV, robotics)*



The Advance to Baghdad



1. Rate of Advance outruns logistics Communications

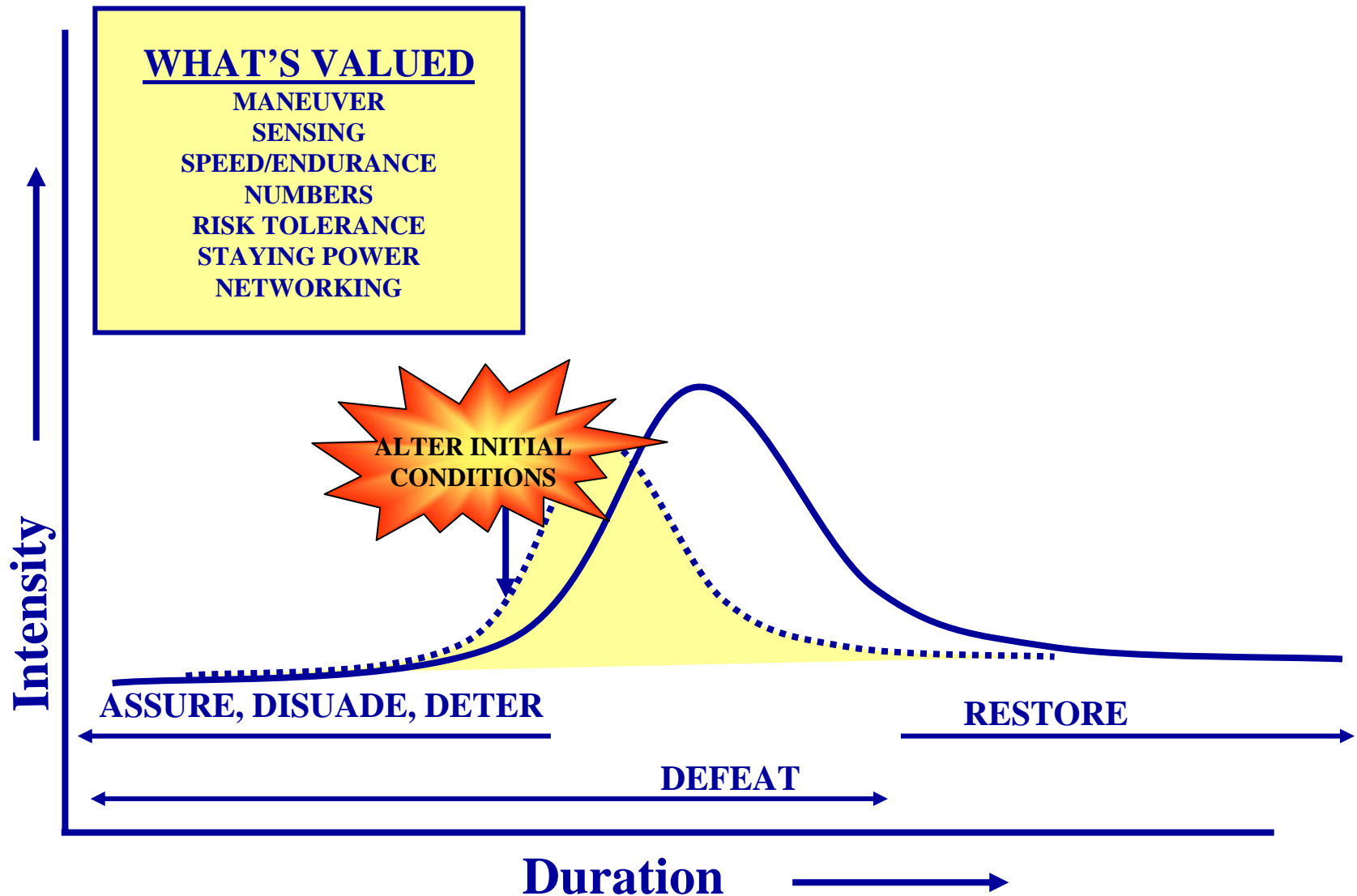
2. Logisticians shift to “push” system – use models, Sitreps, to “sense” supply needs

3. Tactical Units shift to cross supply to fill gaps



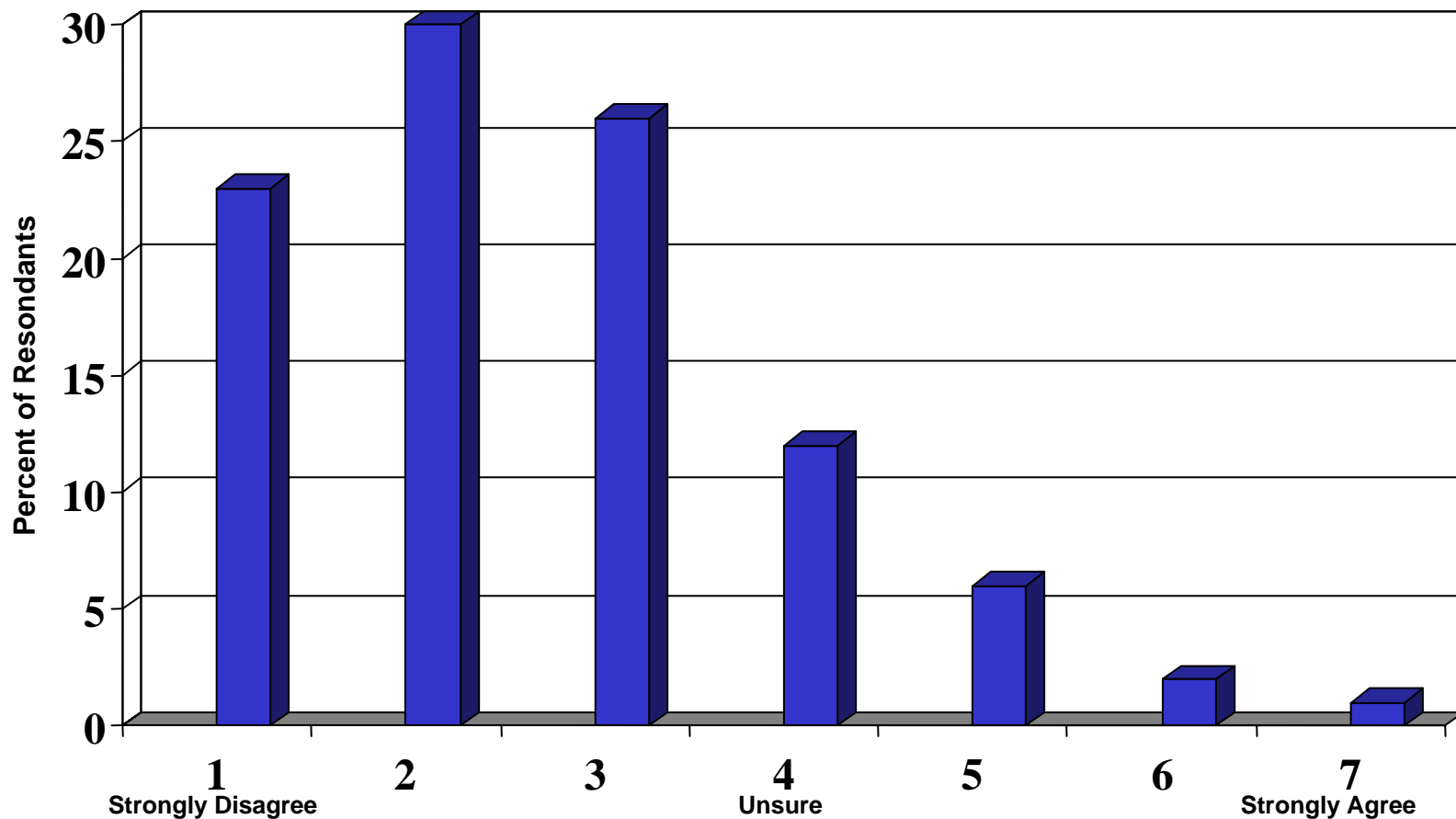
Transforming Defense

...2nd derivative force





Within the next 10 years, some adversaries will likely have the ability to use long-range precision strike weapons such as ballistic and cruise missiles to deny our use of fixed military infrastructure, such as ports, airfields, and logistical sites.

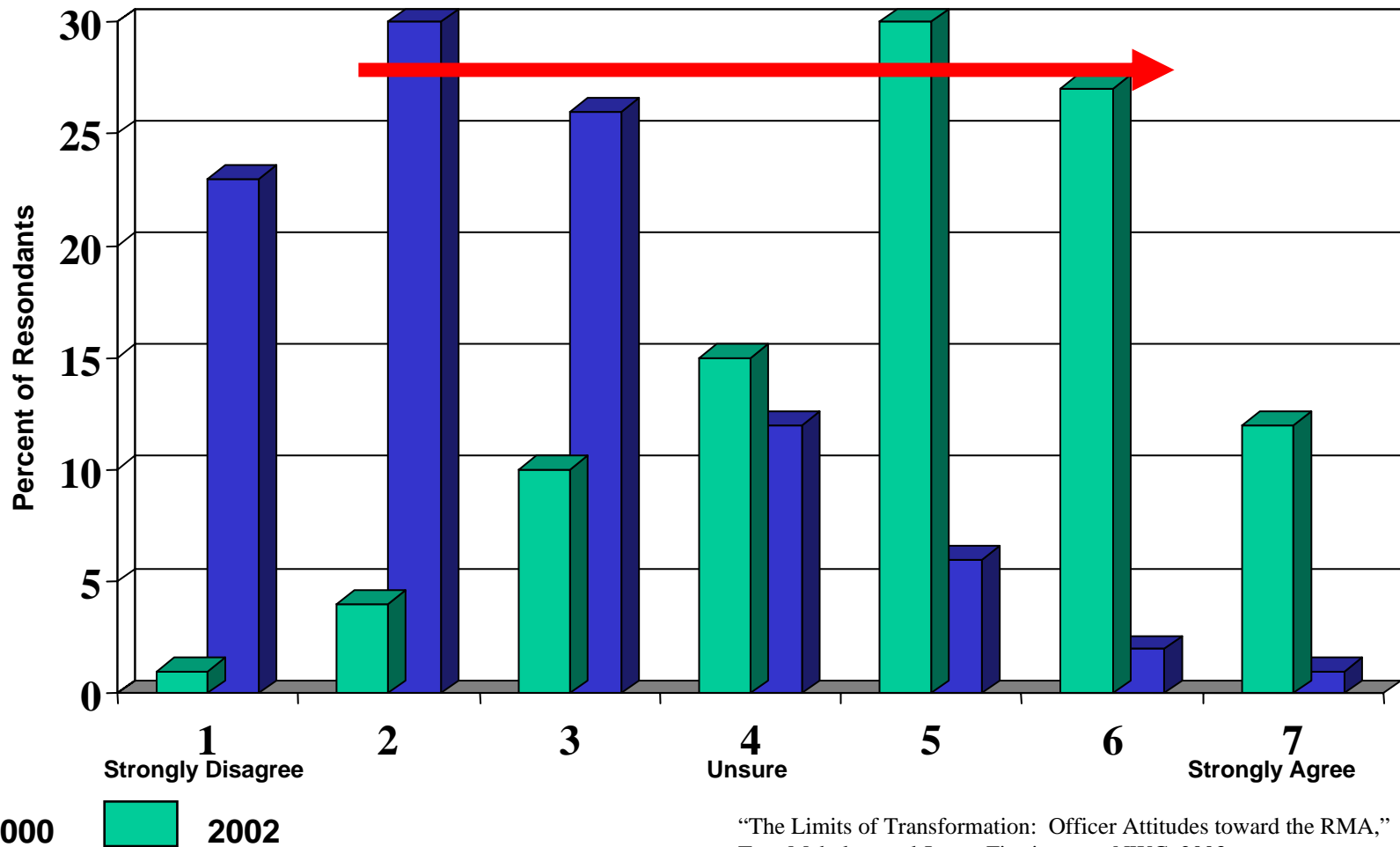


 2000

Source: Thomas G. Mahnken and James FitzSimonds, "Officer Attitudes Toward Innovation", Naval War College, 2002



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“The Limits of Transformation: Officer Attitudes toward the RMA,”
Tom Mahnken and James Fitzsimmons NWC, 2003



Disruptive Security Challenges

...An Approach

Narrow Range of
Disruptive Challenge with
Improved Intelligence

Improve Responses to
Disruptive Challenge with
more Force Flexibility

Dissuade Attempts at
Disruptive Challenge by
Accelerating Transformation























Transforming National Security

...The Logic

...The Dynamic

...The Opportunity

Vision: Broad and Sustained Competitive Advantage

- *Strategic Imperative*
- *New Logic and Metrics*
- *Technology Opportunities*

Information Age

Globalization II

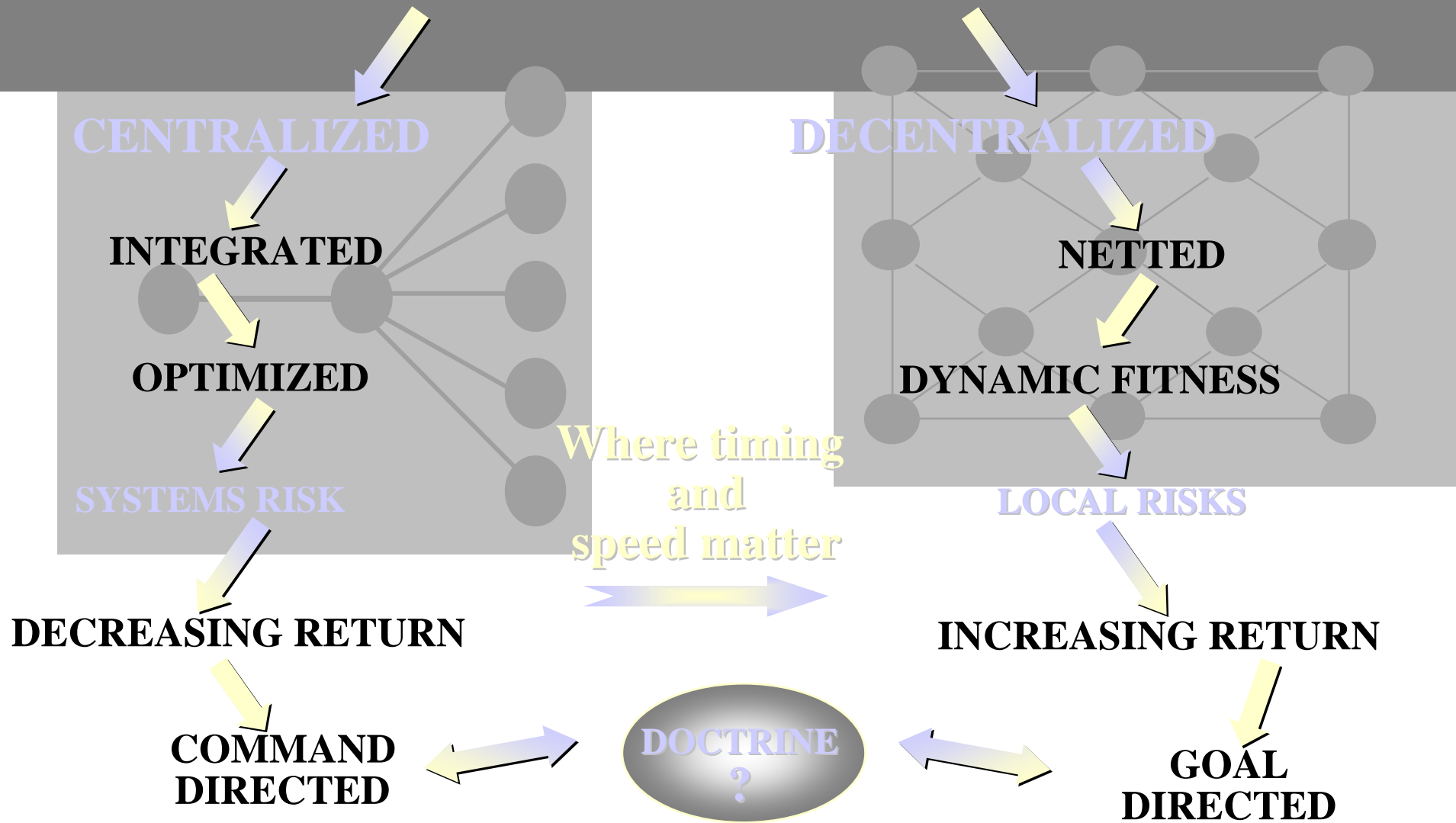
Globalization III

Industrial Age

*Terry J. Pudas
Acting Director, Force Transformation*

18 January, 2006

Architectural Choices



Locating System Complexity



Causes for Increased Speed

Incentives:

- The value of time

“Demassification”:

- The devaluing of distance and geography

More direct coupling of input to output:

- The flattened hierarchy



Speed of Effects

NETWORK CENTRIC WARFARE

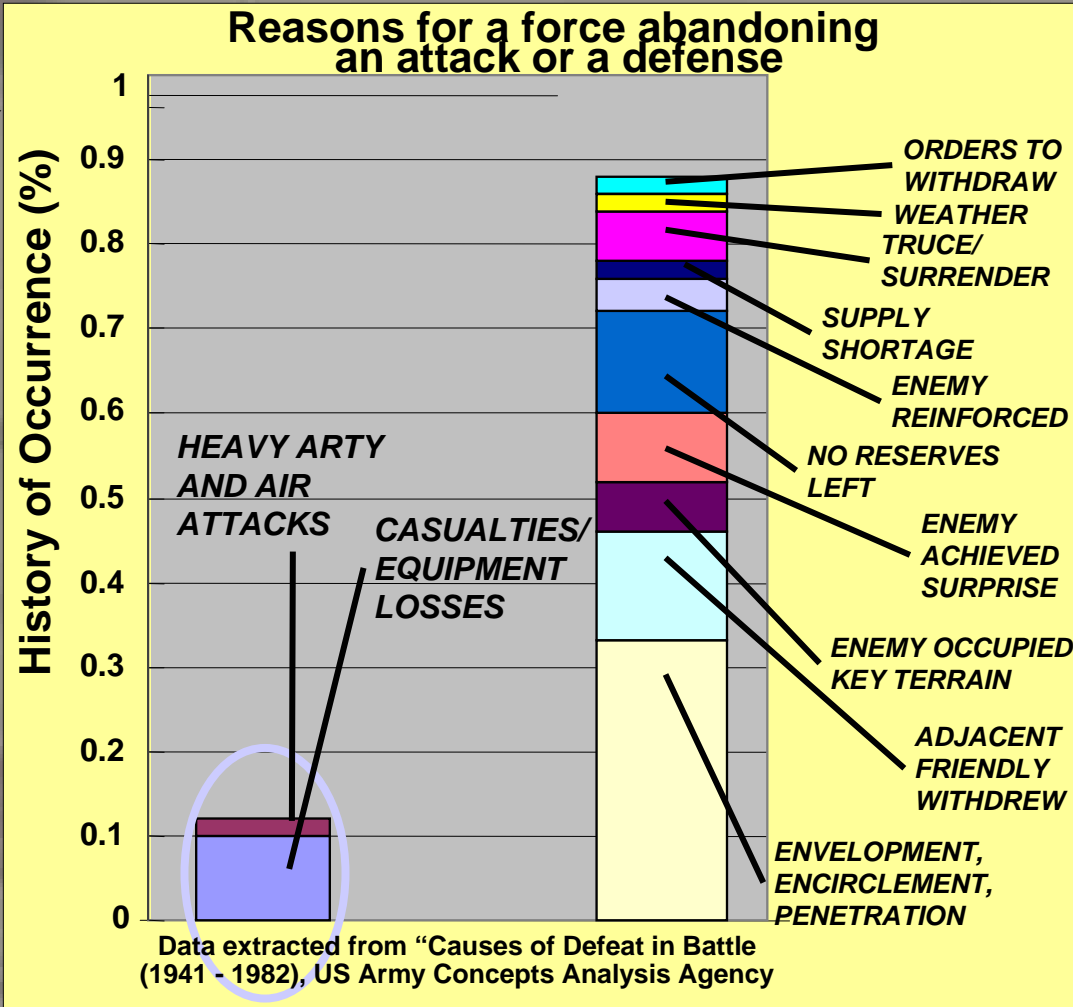
HIGH RATES OF CHANGE
CLOSELY COUPLED EVENTS
LOCK IN/OUT
SPEED OF COMMAND
SELF SYNCHRONIZATION

DOMAINS OF WAR

BELIEF
LEADERSHIP
UNIT COHESION
MORALE

REASON
SA
COMMS
C2

PHYSICAL
MOVE
STRIKE
PROTECT





Effects-Based Warfare

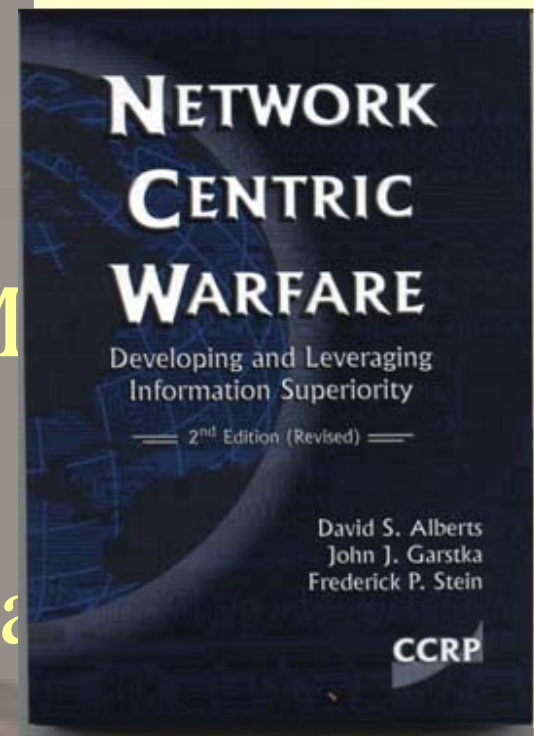
Human Behavior Dominates Outcome

Not modeled well

No rigorously quantifiable M

Appreciated by Clausewitz

Basis of Network-Centric War



Readiness = $f(\text{cohesion, morale, will, cognition, courage})$

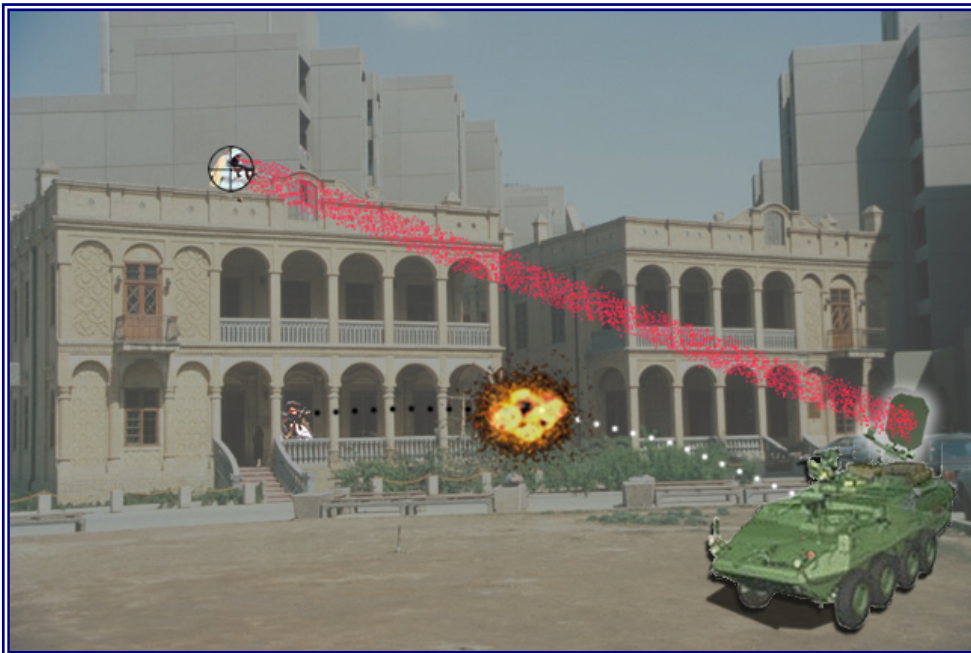


Project “Sheriff”

...Controlling the Engagement Timelines

The Capabilities

- “Speed-of-light Sensing
- Networked
- Lethal/Non-Lethal Options
- Active/Passive Options
- Kinetic/Non-Kinetic Options
- Survivability



The Technology

- Compact Active-Denial Technology
- Phaselator High-Power Direction Hailer
- Vector-Beam High-Power
White/IR Spot Light
- Counter Improvised
Explosive Device (IED)
- Active Protection
- Counter Sniper
- Rapid-Fire Kinetic Weapon
- Multi-Spectral Sensor Suite
- Armor Protection
- Integrated Electronic Warfare Suite
- Net-Centric Technology



Sherriff Video



Full-Spectrum Effects Platform

6



Active Denial Technology (ADT)



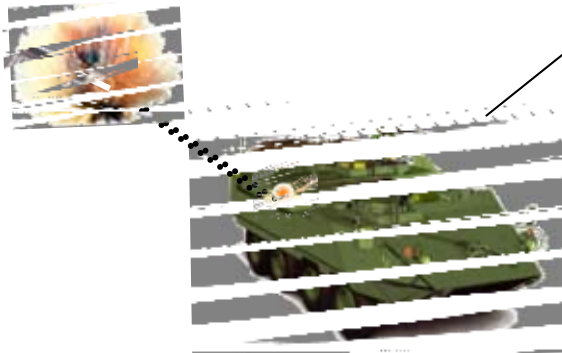
**Laser
Dazzler**



**Long Range
Acoustic Device
(LRAD)**



Gunslinger



Active Protection System (APS)



**Bright White
Light (BWL)**



**Mobile Multiband
Jammer (MMBJ)**



UNMANNED AIRCRAFT SYSTEMS ROADMAP

2005 - 2030



Office of the
Secretary of Defense

Presented by
Mr. Chuck Riechers
Special Assistant
OASD (NII)



Outline

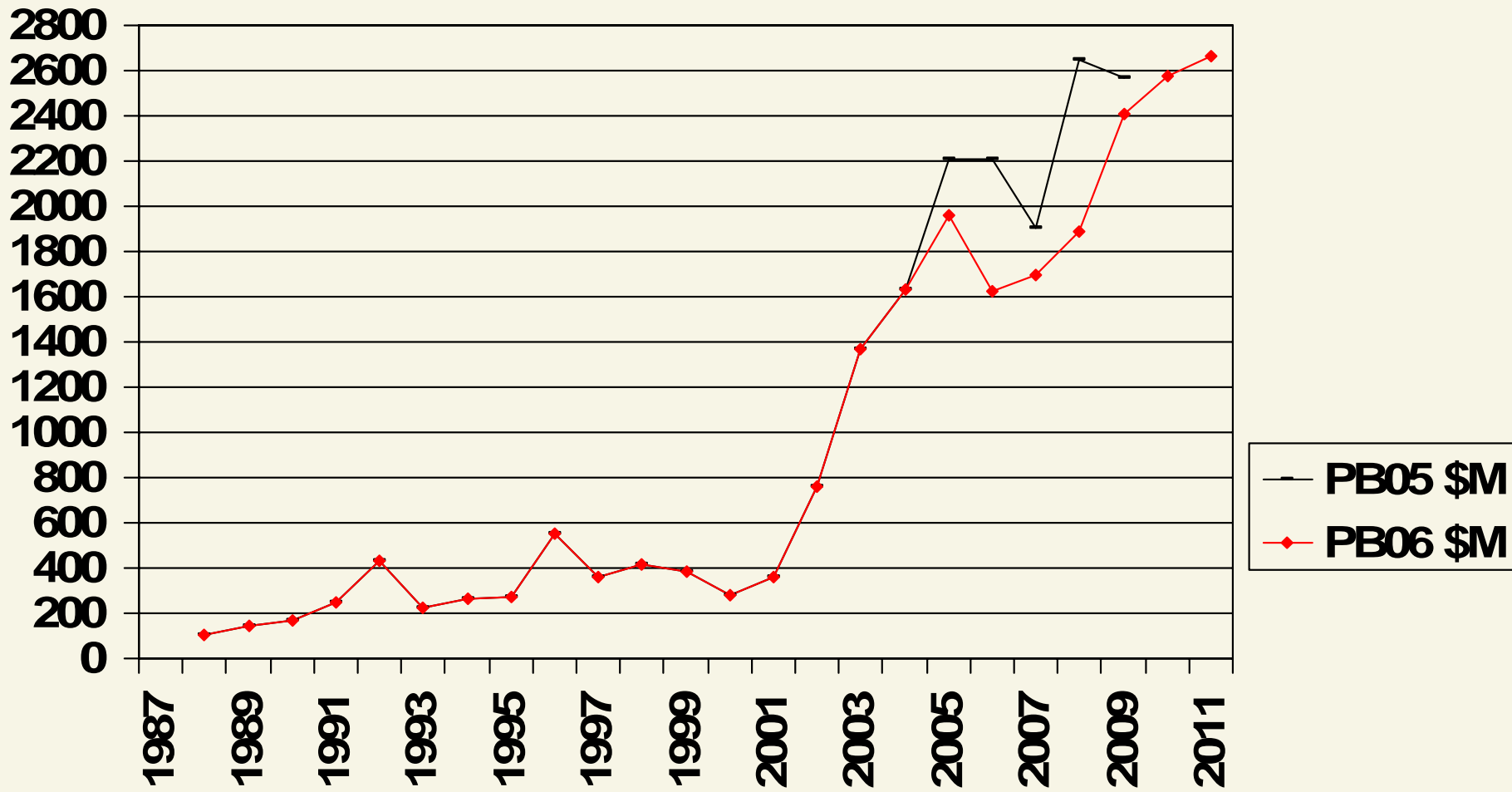
- **Top Level Thoughts**
- **UAS Roadmap, 2005 – 2030**
- **Summary**



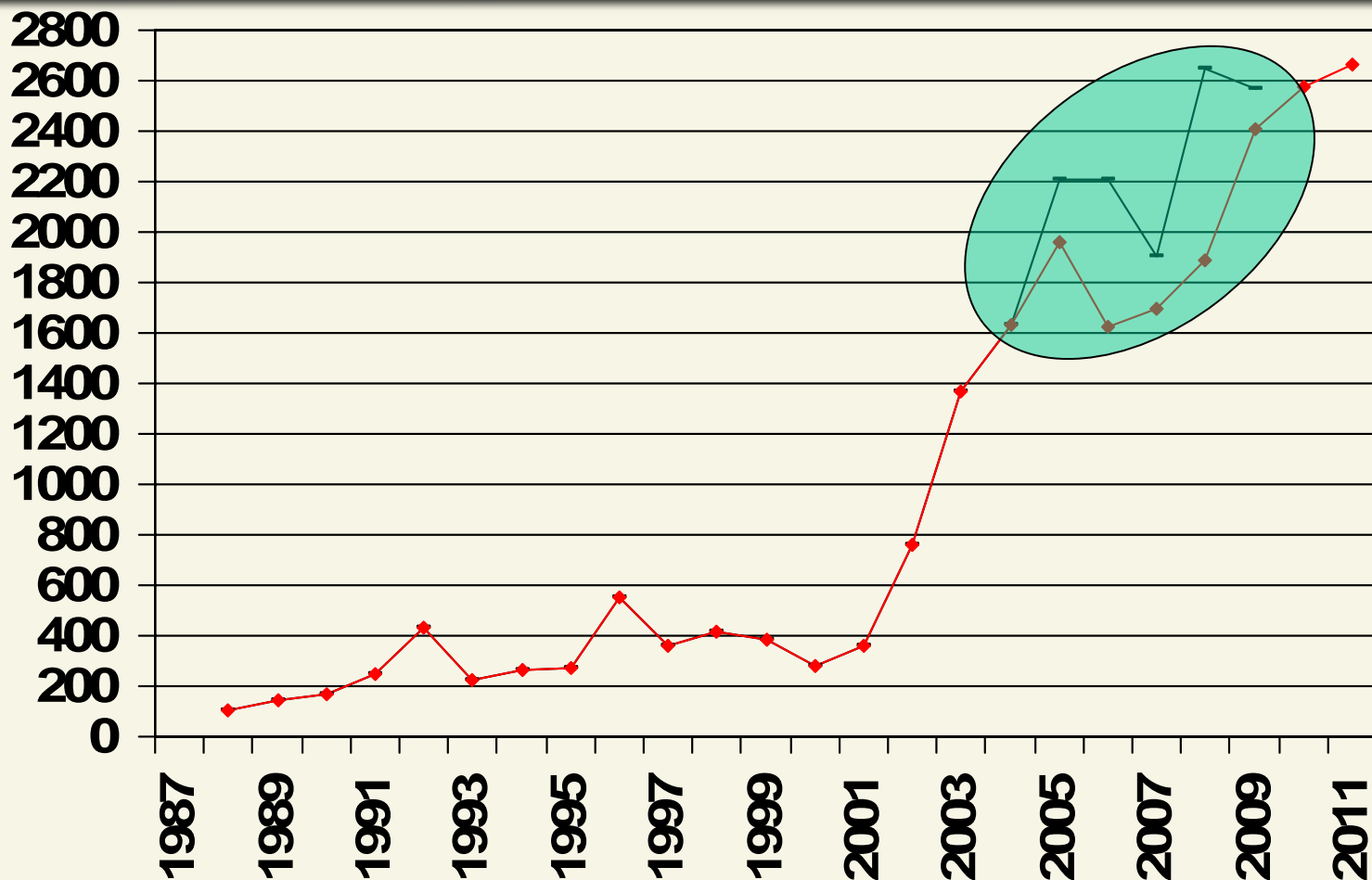
UAS vs. UAV

- **The term “Unmanned Aircraft System (UAS)” describes the entire weapon system that DoD has historically referred to as an “Unmanned Aerial Vehicle (UAV)”**
- **The weapon system includes the aircraft (UA), surface components, and architecture elements**
- **“UAS” is the emerging DoD term**

UAS Funding (RDT&E and Procurement)

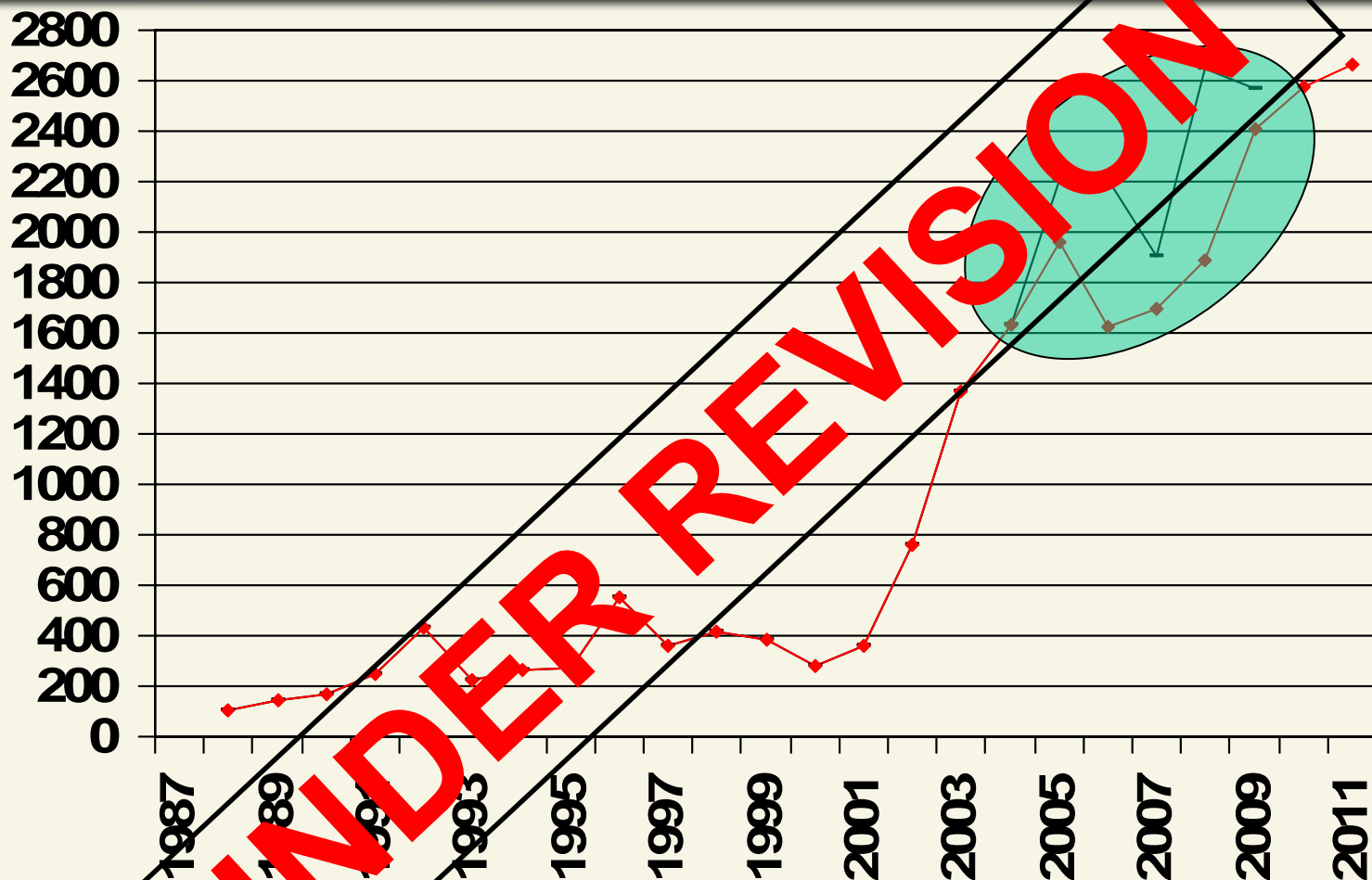


UAS Funding (RDT&E and Procurement)



PB:	05	06	07	08	09
J-UCAS:	0	-395	+20	-489	-207
BAMS:	-28	-142	-287	-241	-106
PB06 Reductions:	-28	-537	-267	-730	-313

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UAS Roadmap, 2005 – 2030



UAS Roadmap Update

Purpose

- **To stimulate the planning process for U.S. military UAS development over the period 2005-2030**
- **To assist DoD decision makers in developing a long-range strategy for UAS development and acquisition**
- **To contribute UAS vectors to the Strategic Planning Guidance and Quadrennial Defense Review**
- **To identify highest value areas for industry investment and areas for international cooperation**



OSD Application

- The Roadmap is *guidance* for the systematic migration of mission capabilities to UAS while addressing the most urgent mission needs that are supported both technologically and operationally
- Roadmap *is not* a budgetary document and does not *direct* funding of UAS and UAS-related technology
 - But it *is* the document we use to evaluate how well the services and components have implemented the OSD UAS vision ...

Roadmap Release


4 AUG 2005

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS
CHIEF OF STAFF OF THE AIR FORCE
CHIEF OF STAFF OF THE ARMY
COMMANDANT OF THE MARINE CORPS
CHIEF OF NAVAL OPERATIONS
DIRECTOR, DEFENSE ADVANCED RESEARCH
PROJECTS AGENCY
DIRECTOR, NATIONAL GEOSPATIAL-INTELLIGENCE
AGENCY

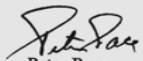
SUBJECT: Unmanned Aircraft Systems (UAS) Roadmap, 2005-2030

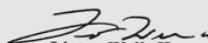
We are pleased to endorse the release of this edition of the UAS Roadmap. The use of UAS in military operations has expanded rapidly since entering the war on terrorism in the fall of 2001. Supporting military operations in both Iraq and Afghanistan, unmanned aircraft have transformed the current battlespace with innovative tactics, techniques, and procedures. UAS not only provide persistent intelligence, surveillance, and reconnaissance, but also very accurate and timely direct and indirect fires. Combatant Commanders are requesting UAS in even greater numbers. Our challenge is the rapid and coordinated integration of this technology to support the joint fight.

The overarching goal of this Roadmap is to guide the Department toward a logical, systematic migration of UAS mission capabilities focused on the most urgent warfighter needs.


Stephen A. Cambone
USD(I) JUL 20 2005


Kenneth F. Krieg
USD(AT&L)


Peter Pace
General, USMC
Vice Chairman, JCS


Linton Wells II
Acting, ASD(NII)

- Endorsed by
 - USD (AT&L)
 - USD (I)
 - ASD (NII)
 - VCJCS
- Released Aug 4, 2005

**The *Unmanned Aircraft Systems Roadmap, 2005 – 2030* is available at:
www.acq.osd.mil/uas**



Changes

● Deletions

- Small UAV and Weapons appendices incorporated into appropriate chapters

● Additions

- Airships
- Department of Homeland Security appendix
- UAS Support to Military Operations (classified) Appendix

● Major Revisions

- Communications
- Sensors
- Standards
- Airspace Integration Plan for Unmanned Aviation
- Survivability



Contents

- Roadmap
 1. Introduction
 2. Current UAS
 3. Requirements
 4. Technologies
 5. Operations
 6. Roadmap

- Appendices



Appendices

- A. Missions
- B. Sensors
- C. Communications
- D. Technologies
- E. Standards
- F. Airspace
- G. Task, Post, Process and Use Considerations
- H. Reliability
- I. Department of Homeland Security
- J. Unmanned Ground Vehicles
- K. Survivability
- L. UAS Support to Military Operations (Classified)



UAS Roadmap Goals (1 - 4)

- 1. Develop and operationally assess a joint unmanned combat aircraft system**
- 2. Field secure Common Data Link (CDL) compatible communications for aircraft control and sensor product data distribution for all tactical and larger UA, with improved capability to prevent interception, interference, jamming, and hijacking**
- 3. Comply with the existing National Geospatial-Intelligence Agency (NGA) metadata standards for all full motion video-capable UA, and fielding of a near real-time UAS metadata derived targeting capability**
- 4. Foster the development of policies, standards, and procedures that enable safe, timely, routine access by UA to controlled and uncontrolled airspace**



UAS Roadmap Goals (5 - 9)

- 5. Improve Combatant Commander UAS effectiveness through improved joint service collaboration**
- 6. Develop and field reliable propulsion alternatives to gasoline-powered, internal combustion engines on UA**
- 7. Improve adverse-weather UA capabilities to provide higher mission availability and mission effectiveness rates**
- 8. Ensure standardized and protected positive control of weapons carried on UA. Develop a standard UAS architecture including weapons interface for all appropriate UA**
- 9. Support rapid integration of validated combat capability in fielded/deployed systems through a more flexible test and logistical support process**



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Communications Appendix

- **UAS need to interface to and be an integral part of the Global Information Grid (GIG)**
- **Provide guidance on the UAS network migration path to industry and to the Services**
 - **Acquisition Functions**
 - Migrate to Common Data Link (CDL) based communications
 - FY06 Appropriations Bill Mandate
 - Procure Joint Tactical Radio System/Software Configuration Architecture compliant systems when available
 - Meet spectrum guidelines
 - **Operators**
 - Networking enables new operational constructs: research, demos, CONOP development and exercises needed to flesh out
 - Mitigate/eliminate spectrum related deployment/employment issues
 - **Industry**
 - Know up front what is expected/accepted
 - Focus development/product lines to meet commercial and DoD needs
- **Provide reference of standards and implementation dates**



Communications Appendix Continued

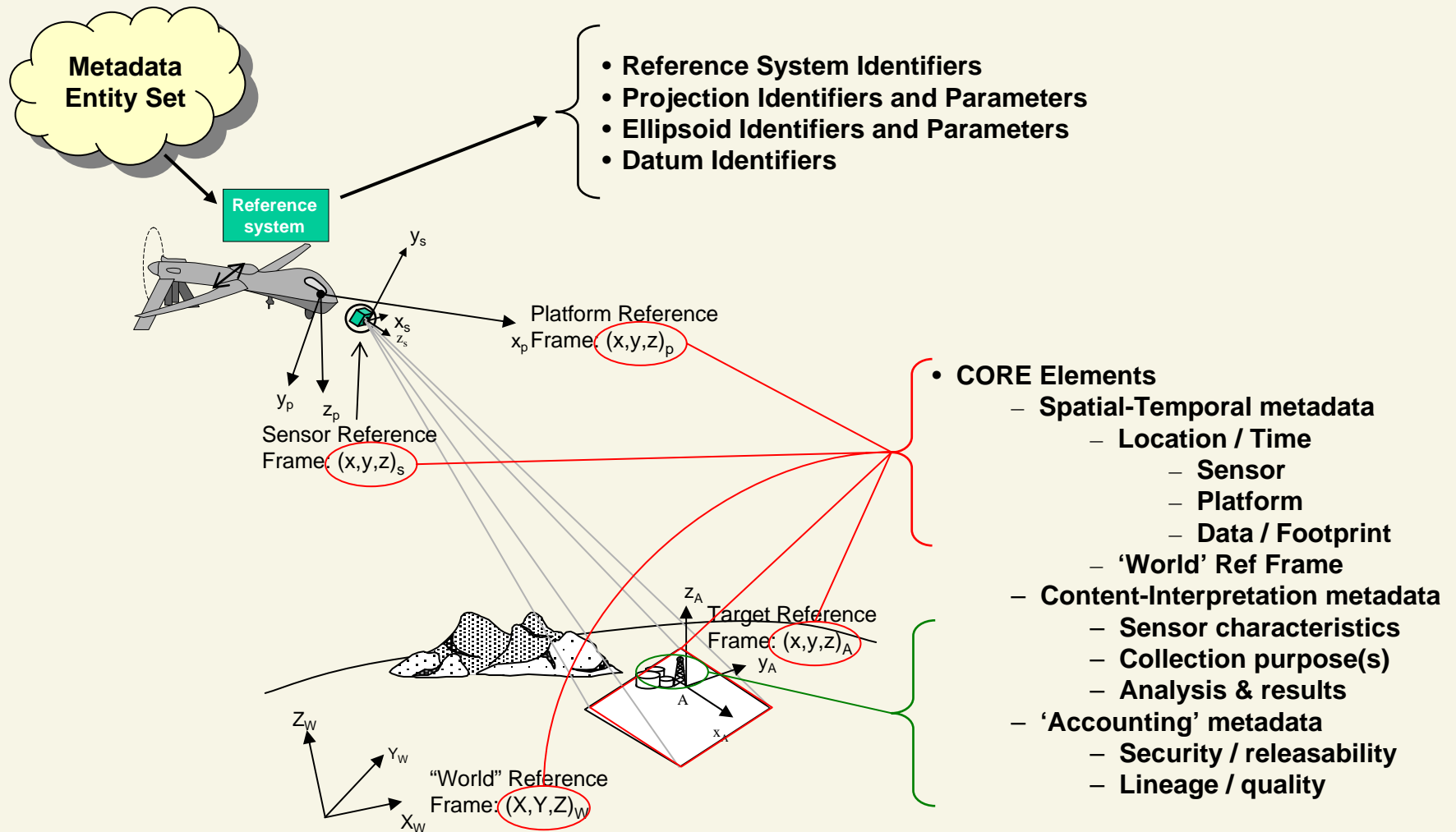
- **Addresses key UAS functional interfaces that should be accessible through the GIG**
 - **Situational Awareness**
 - **Vehicle Control – Everything but payloads and weapons**
 - **Payload**
 - Product
 - Control
 - **Weapons**
 - Kinetic (bombs, missiles, etc.)
 - Non-kinetic (electronic warfare, directed energy, etc.)
- **Establishes minimum communications interoperability standards required of all DoD UAS programs**
 - **Examples:**
 - Weapons security, air vehicle security, payload security, ATC interface
 - Allowing machine to machine sensor tasking, while precluding inadvertent automatic weapons employment



Sensors Appendix

- **Minor revisions**
 - Refinements based upon OEF/OIF experiences
- **Focus on metadata and applications**
 - **NGA Motion Video Metadata (KLV) allows derivation of PGM-grade coordinates in near real-time from video**
 - GRIDLOCK ACTD
 - **Critical component of GIG integration**
 - Makes integration/fusion of product and use by others easier
 - Machine to machine capability
- **Discussion of next generation of sensors**
 - **Synthetic Aperture Radar (SAR)**
 - Migration to operational level systems (Extended Range/Multi Purpose)
 - Advanced Technology migration path (Foliage Penetration, Inverse SAR, Air-to-Air)
 - **Digital video/metric sensor**
 - Migration to all digital, full metadata capability (High Definition TV)
 - **Multi/Hyper spectral**
 - Cueing and target confirmation
 - **Signals Intelligence (SIGINT)**

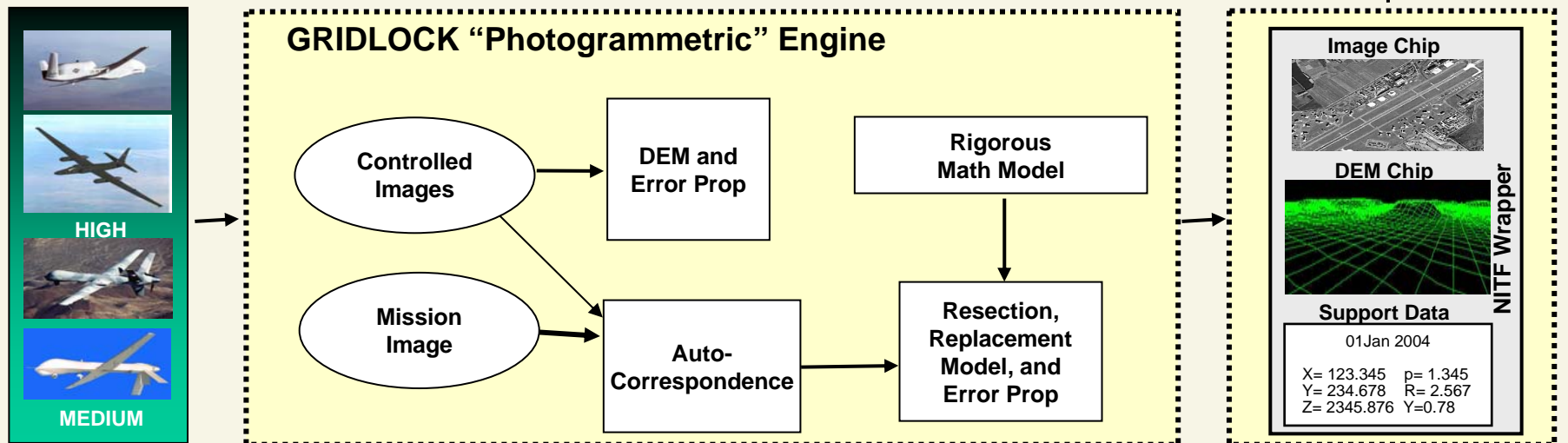
Tactical ISR Metadata



GRIDLOCK Approach

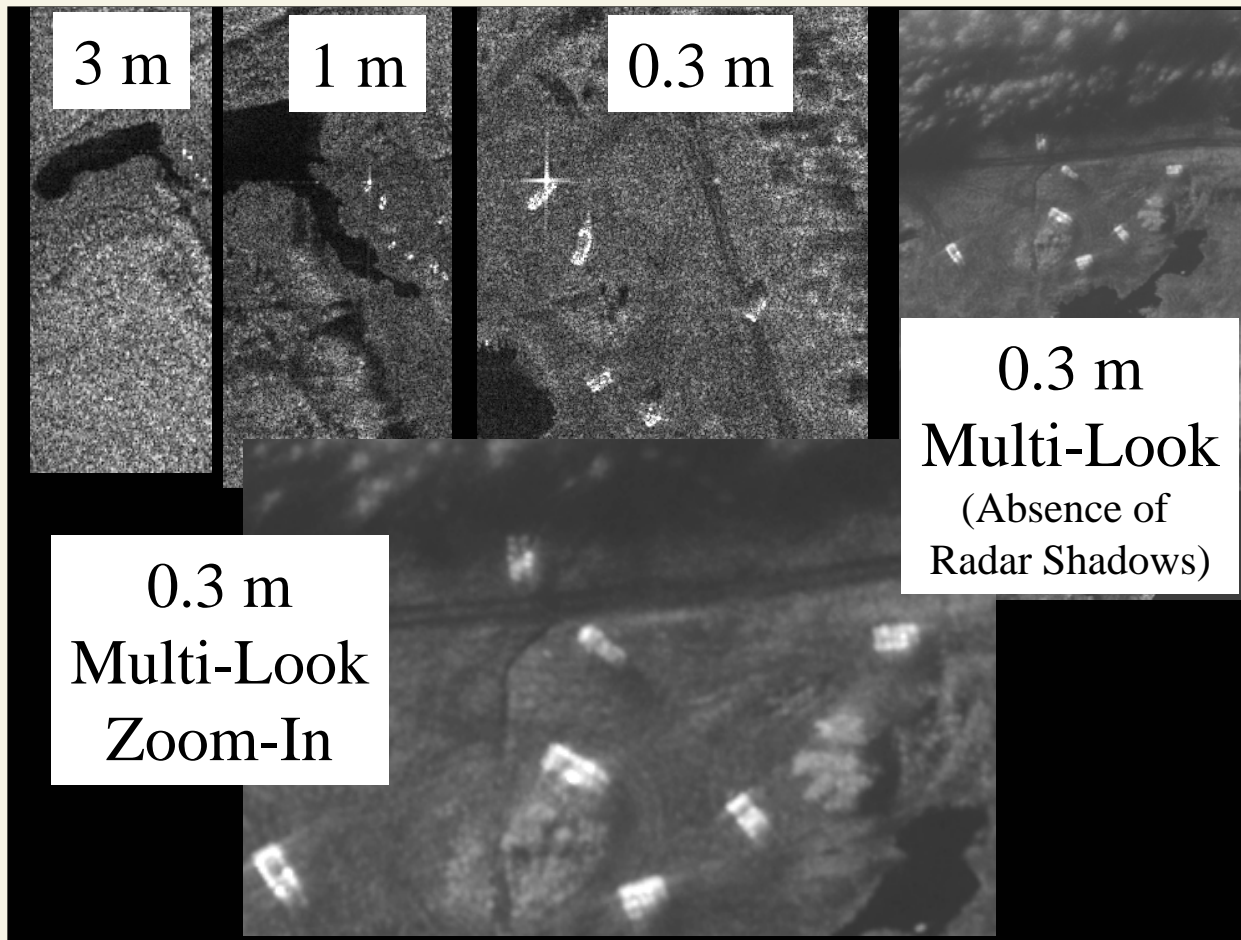
Core Image Science / Photogrammetric Processes Required to Generate Smart Image

- Auto-correspondence between mission and reference imagery
- Auto-generation of DEM on-the-fly
- Rigorous photogrammetric resection to update the initial support data of mission image
- Complete and rigorous error propagation to yield reliable target CE/LE





LYNX SAR



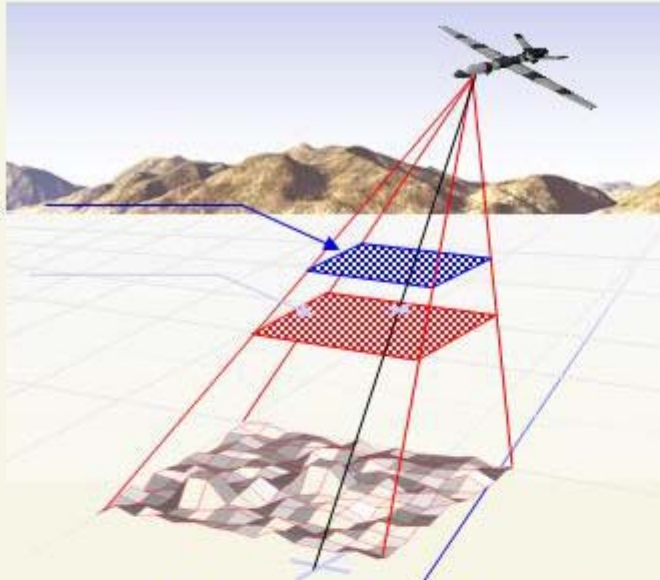
Convoy Search Ft Dix: 2 x Cargo Trucks / 6 x Hummers



Metric Sensor

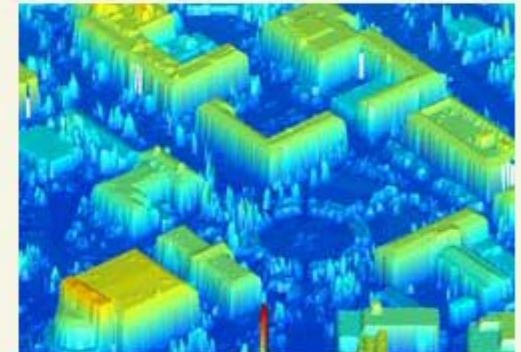
(Precision View Approach)

Image
DEM



**Broad Area
Search
(BAS)**

**High-
Resolution
Terrain
Information
(HRTI)**



**High-
Resolution
Point
Target**



UAS Roadmap Summary

- Roadmap reflects influence of GWOT
- Focus on standards and integration
- OSD UAS development reference document

The *Unmanned Aircraft Systems Roadmap, 2005 – 2030* is available at:
www.acq.osd.mil/uas



[**www.acq.osd.mil/uas**](http://www.acq.osd.mil/uas)



National Military **Strategy**



Lieutenant Colonel Jay F. Rouse
Strategic Planner, Strategy Division
Directorate of Strategic Plans & Policy (J5)
The Joint Staff
25 January 2006



Changing Strategic Environment

2001

- Peacetime “Window”
- Leap Ahead Technology
- Deter in Critical Regions
- Short Campaigns
- Respond/Defeat Aggression

**QDR
2005**

QDR 2005

**Iraq
Reconstruction**

**Operation
Iraqi
Freedom**

**2002
NSS**

**War on
Terrorism**

**Operation
Enduring
Freedom--
Afghanistan**

**Operation
Noble Eagle—
United States**

TODAY

- Global War—GWOT
- In Stride Transformation
- Prevention and Preemption
- Sustained Stability Operations
- Realigned Global Force Posture
- Reshape & Recapitalize Force

QDR 2001



Aligned Strategies

Geo-Political/Geo-Economic

National Security Strategy

- National Interests, Goals & Priorities
- Integrating Instruments of National Power

U.S. Government

Political-Military

National Defense Strategy

- Strategic Context & Assumptions
- Strategic Objectives
- Implementation Guidelines

Department of Defense

Military-Operational

National Military Strategy

- Military Objectives
- Missions, Tasks & Endstates
- Desired Capabilities, Attributes

Armed Forces



National Security Strategy

“MAKE THE WORLD NOT ONLY SAFER, BUT BETTER”

Goals

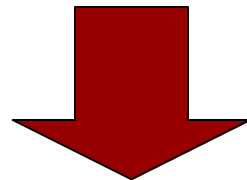
- ***Political and economic freedom***
- ***Peaceful relations with other states***
- ***Respect for human dignity***

Approaches

- ***Champion human dignity;***
- ***Strengthen alliances to defeat global terrorism, prevent attacks;***
- ***Defuse regional conflicts;***
- ***Prevent the threat of WMD;***
- ***Ignite global economic growth;***
- ***Expand the circle of development;***
- ***Develop agendas for cooperative action;***
- ***Transform national security institutions***

Instruments

- ***Diplomacy***
- ***Information***
- ***Military***
- ***Economic***



National Defense Strategy



National Defense Strategy

Objectives

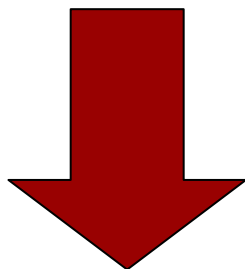
- *Secure US from direct attack*
- *Secure strategic access & retain global freedom of action*
- *Strengthen alliances & partnerships*
- *Establish favorable security conditions*

Activities

- *Assure allies & friends*
- *Dissuade adversaries*
- *Deter aggression & counter coercion*
- *Defeat adversaries*

Attributes

- *Forces sized, shaped, & postured to support global operations*



National Military Strategy

PROTECT --- PREVENT --- PREVAIL



National Military Strategy

National Military Objectives

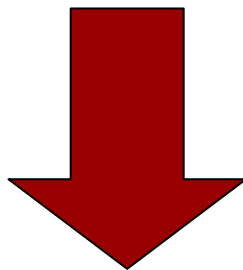
- ***Protect the United States***
- ***Prevent conflict & surprise attack***
- ***Prevail against adversaries***

Force Employment Concepts

- ***Joint Operating Concepts***
- ***Joint Functional Concepts***
- ***Joint Integrating Concepts***

Force Design Force Size

- ***Implications of 1-4-2-1 Force Planning Construct***
- ***Capabilities to achieve Full - Spectrum Dominance***



Strategic Direction to The Armed Forces

PLANS - RESOURCES - DOCTRINE



Military Implications of the Environment

- **Wider Range of Adversaries.**

- States and Non-state actors.
- New methods of deterrence and operational approaches.

- **More Complex & Distributed Battlespace.**

- High intensity combat.
- Insurgency and unconventional warfare.
- Terrorism.
- Computer network attack.
- Requires integrated approaches—interagency and multinational partners—throughout strategic depth.

- **Technology Diffusion & Access.**

- Lost cost advancements to adversary military capabilities.
 - Ballistic missiles and Weapons of Mass Destruction (WMD).
 - Communications and navigation advances, satellite imagery.
- Transform in stride to stay ahead of adversaries.

Full spectrum capabilities still required.



CJCS Priorities

- **Win the War on Terrorism.**

- Achieve **enduring victory** in **Iraq** and **Afghanistan**.
- Globally disrupt and **defeat terrorist networks**.
- **Prevent terrorist** acquisition and use of **WMD/E**.
- Create and sustain a global **anti-terrorism environment**.

- **Enhance Joint Warfighting.**

- Further develop trust and **confidence between Services** through training, education and exercises.
- Improve **integration** between **interagency** and **multinational partners**.
- **Eliminate gaps and seams** among combatant commands and coalition partners.

- **Transform the Force.**

- Develop new force employment **concepts** – new ways to use the force.
- Integrate new warfighting capabilities – **rapid prototyping and fielding**.
- Leverage research and development efforts – **anticipate emerging challenges**.



Strategic Principles

- **Agility**
 - Contend with uncertainty and counter surprise.
 - Retain the initiative.
 - Simultaneous, non-linear operations.
- **Decisiveness**
 - Generate specific effects to accomplish objectives.
 - Control any situation or defeat any adversary.
 - Achieve overmatch in capabilities.
- **Integration**
 - Focus and unity of effort and enhance collaboration.
 - Fuse and synchronize military with other instruments of national and international power.
 - Conduct seamless operations.

These principles stress speed and support the concept of surging capabilities from widely dispersed locations



A Joint Force for Mission Success

- **Desired attributes – characteristics of the Joint Force:**
 - Fully Integrated
 - Expeditionary
 - Networked
 - Decentralized
 - Adaptable
 - Decision Superior
 - Lethal
- **Functions– actions the Joint Force must perform:**
 - Applying Force
 - Deploying and Sustaining Military Capabilities
 - Securing Battlespace
 - Achieving Decision Superiority

Commanders define required capabilities through analysis of the critical joint functions required to accomplish each mission or task.



Linking NMS Objectives to Capabilities

National Military Objectives

Protect the United States

Military Missions & Tasks

- Counter threats close to their source
- Protecting strategic approaches
- Defensive actions at home
- Support to civil authorities and consequence management
- Creating a global anti-terrorism environment

Prevent Conflict and Surprise Attack

- Forward posture and presence
- Promote security
- Deterring aggression
- Prevent surprise attacks
- Eliminate safe havens
- Preempt in self-defense

Prevail Against Adversaries

- Battlespace Preparation
- Swiftly Defeat Adversaries in Overlapping Campaigns
- Win Decisively to Achieve More Enduring Results
- Conduct Post-conflict Stability and Reconstruction Operations

Applying Force

- Battlespace Shaping through Security Cooperation Activities and Exercises
- Preemptive Global Strike
- Counter Anti-Access & Area Denial
- Forward Deterrence, Flexible Deterrent Options (FDOs) and Strategic (including Nuclear) Deterrence
- Land Control, Maritime/Littoral Control, Air Control, and Space Control Operations, and CIP
- Non-traditional Operations and Stability Operations
- Defend against Air and Missile Threats
- Interagency Interoperability Training
- Support to Civil Authorities & Consequence Management

Deploying & Sustaining Military Capabilities

- Forward Stationed, Rotational and Temporarily Deployed Capabilities
- Strategic Lift
- Force Generation & Management
- Logistics

Securing Battlespace

- Prevent WMD attacks
- Protection & Homeland Defense

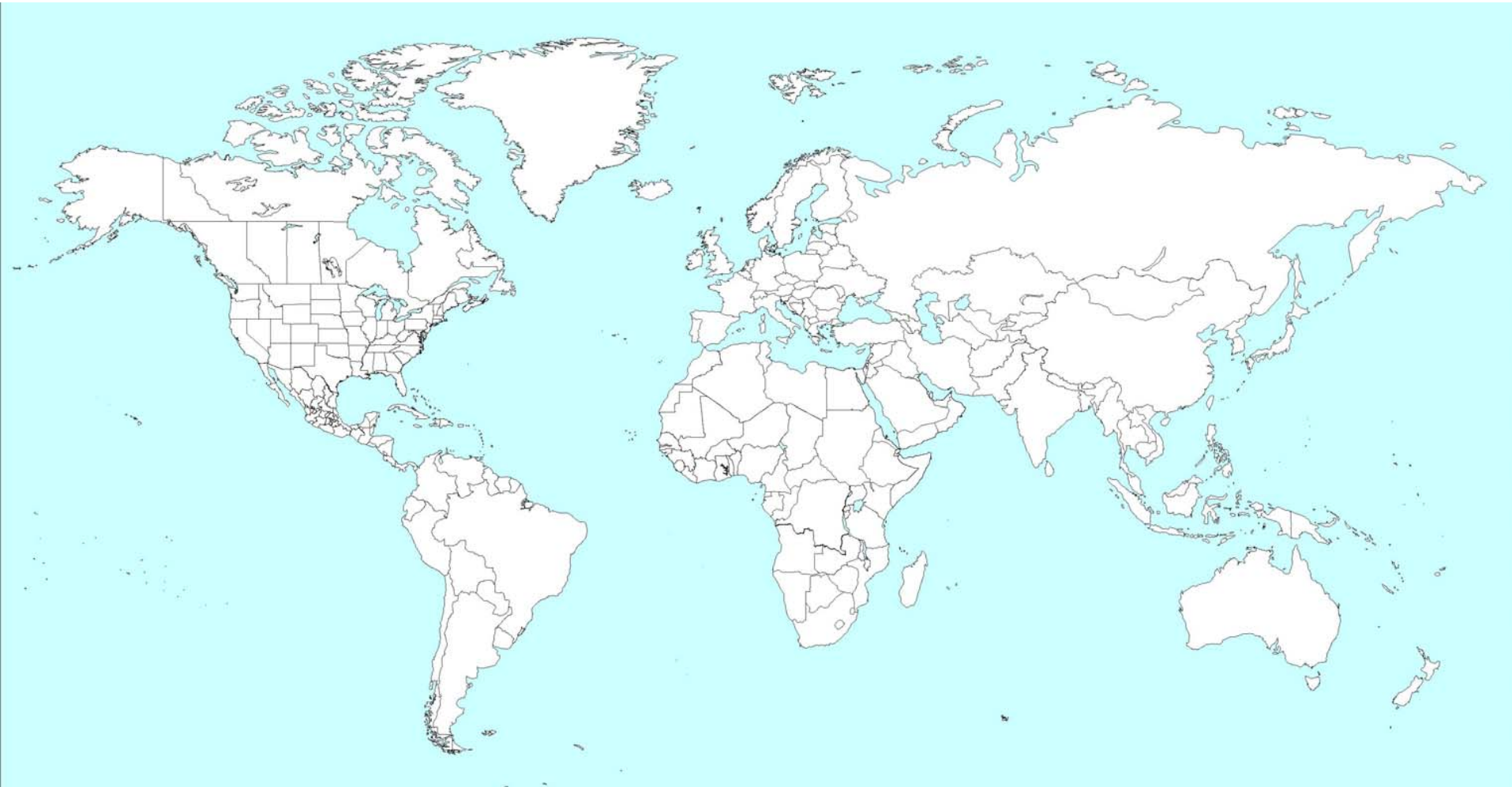
Achieving Decision Superiority

- Battlespace Awareness and Persistent Surveillance
- Command & Control, Network Operations, intelligence sharing, and Interagency Coordination
- Network Operations and Strategic Communications



National Military Strategy

A proactive strategy for a complex world





Protect

Counter threats close to their source



Forward Engaged Coalition Forces – MNF-I, KFOR, Plan Colombia
WMD Interdiction – Proliferation Security Initiative
Security Cooperation – Trans-Sahara Counter Terrorism Initiative
Kill/Capture Operations - SOF Capabilities
Global Intelligence Collection - HUMINT



Protect

Protect strategic approaches



Strait Patrols— Malacca, Hormuz, Gibraltar

Border interdiction - JTF-North

Counterdrug - JIATF-South

Maritime Interdiction – Navy / Coast Guard Boardings

Space-Based intelligence – Multinational Info Sharing Network

**Emphasis on
Interagency
& Partners**



Protect

Defensive actions at home



Operation Noble Eagle - Ground-Based Air Defense, CAP, CIP
Missile Defense System – GBI, Ground/Sea/Space-based Sensors
State and Federal capabilities - CBRNE Units and Teams
Enhancing First Responder Capabilities – C2 systems, training
Military Support to Civilian Authorities – Consequence Management



Protect

Create a global anti-terrorism environment



Prevent Terrorist Safe Havens - JTF HOA

Interagency Anti-Terror Operations – Philippines

Partner Capacity - NATO coordination w/ Collective Security Treaty Org

Humanitarian Assistance – Tsunami Relief



Prevent

Forward posture and presence



- World-wide naval presence
- Main Operating Bases - Japan, Germany, Bahrain...
- Forward Operating Sites - Singapore, Honduras, Bulgaria...
- Cooperative Security Locations - Poland, Eritrea, Kazakhstan...
- Strike Assets in Guam
- Southern European Task Force
- NATO Reaction Force



Prevent

Promote security

Multi-national security cooperation activities:

- **Improve nation capabilities**
- **Strengthen regional stability**
- **Enhance intelligence links and cooperation**
- **Coordinate Missile Defense**



Multinational exercises:

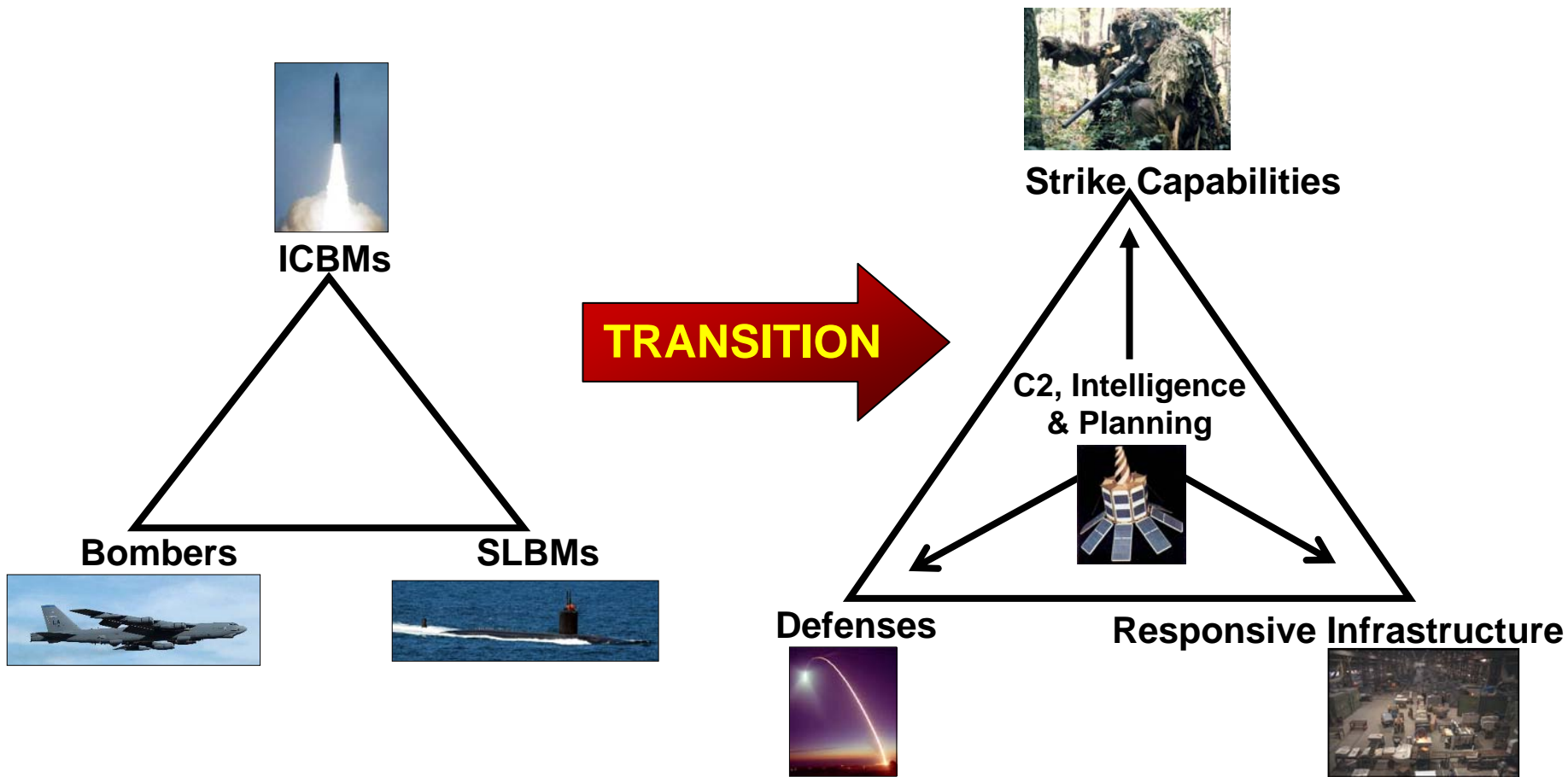
- **RIMPAC (Eastern & Western Pacific)**
- **UNITAS (South America)**
- **NATO Partnership for Peace (Europe)**
- **Cooperative Afloat Readiness and Training (CARAT) – (SE Asia)**
- **Multi-Nat'l Security Transition Cmd – (Iraq)**





Prevent

Deter aggression



Full Range of Nuclear & Non-Nuclear Strike Options



Prevent

Prevent surprise attack



Increase Intelligence

- **Homeland Security Information Network (HSIN)**
- **Multinational Information Sharing (MNIS) Network**
- **Combined Federated Battle Lab Network**
- **STONEGHOST (Shared SIPRNET Access)**

Enhanced Early Warning

- **NORAD**
- **Operation Noble Eagle**
- **Maritime Interception Operations**
- **Partner Capacity**



Prevail

Swiftly defeat adversaries



**Enhanced Intelligence, Surveillance and Reconnaissance
Global Reach, Precision Strike
Expeditionary Operations – Land, Sea, & Air
Transformation – UA, ESG, AEF, CNO**



Prevail

Win decisively to achieve enduring results

Afghanistan
Operation Enduring Freedom

Iraq
Operation Iraqi Freedom

**Major Combat
Operations**



**Reconstruction &
Stability**



***“Make the world not only safer but better”
2002 National Security Strategy***





Prevail

Stability and Reconstruction Operations



Beyond Iraq and Afghanistan...

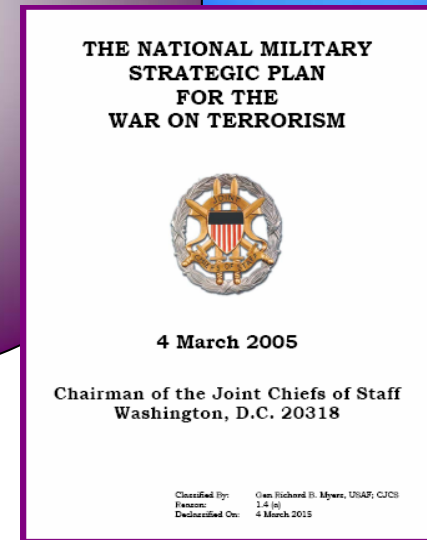
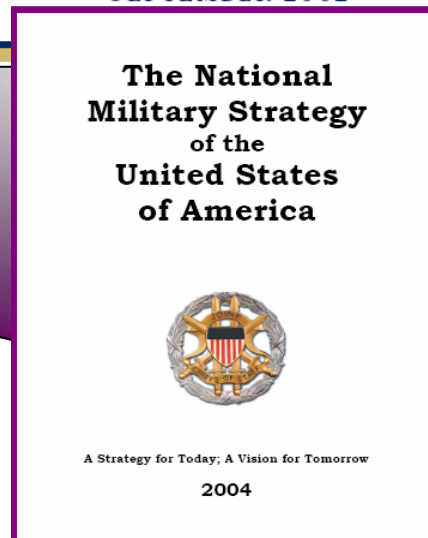
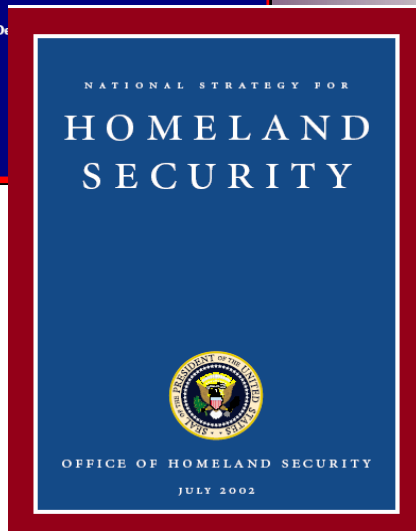
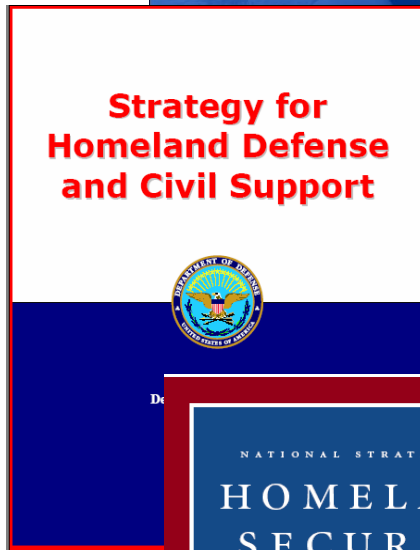
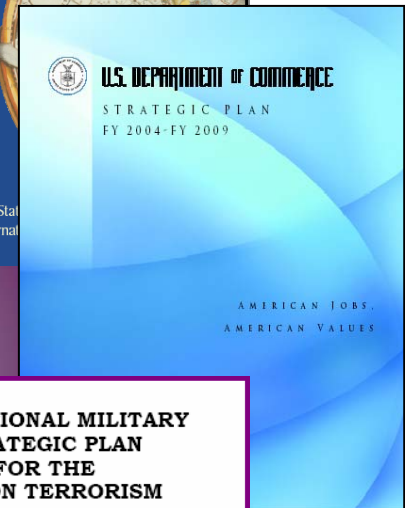
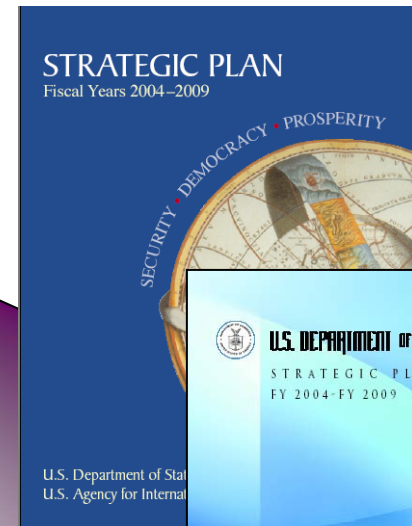
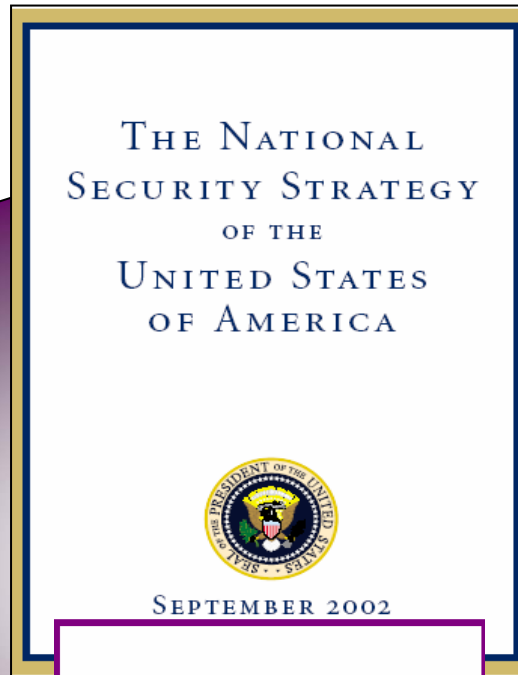
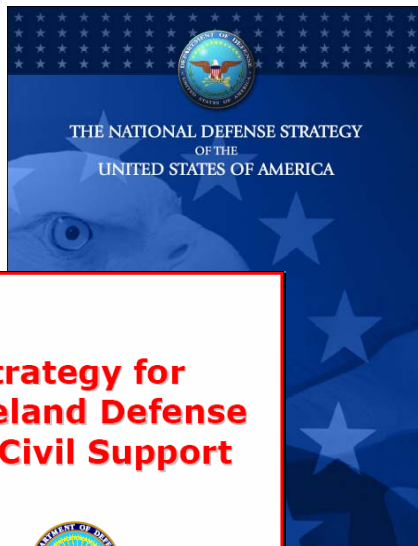
U.S. Support Group East Timor: HA/Infrastructure Development

KFOR Kosovo: Governance and Peace Keeping

Africa Anchor States: Kenya, Nigeria – Building Partner Capacity



Linked Strategies





NMS – Way Ahead

- **QDR Impacts**
- **Adjustments to the NDS?**
- **New Chairman**
- **NMS Report – February 2006**

**The National
Military Strategy
of the
United States
of America**



A Strategy for Today; A Vision for Tomorrow

2006

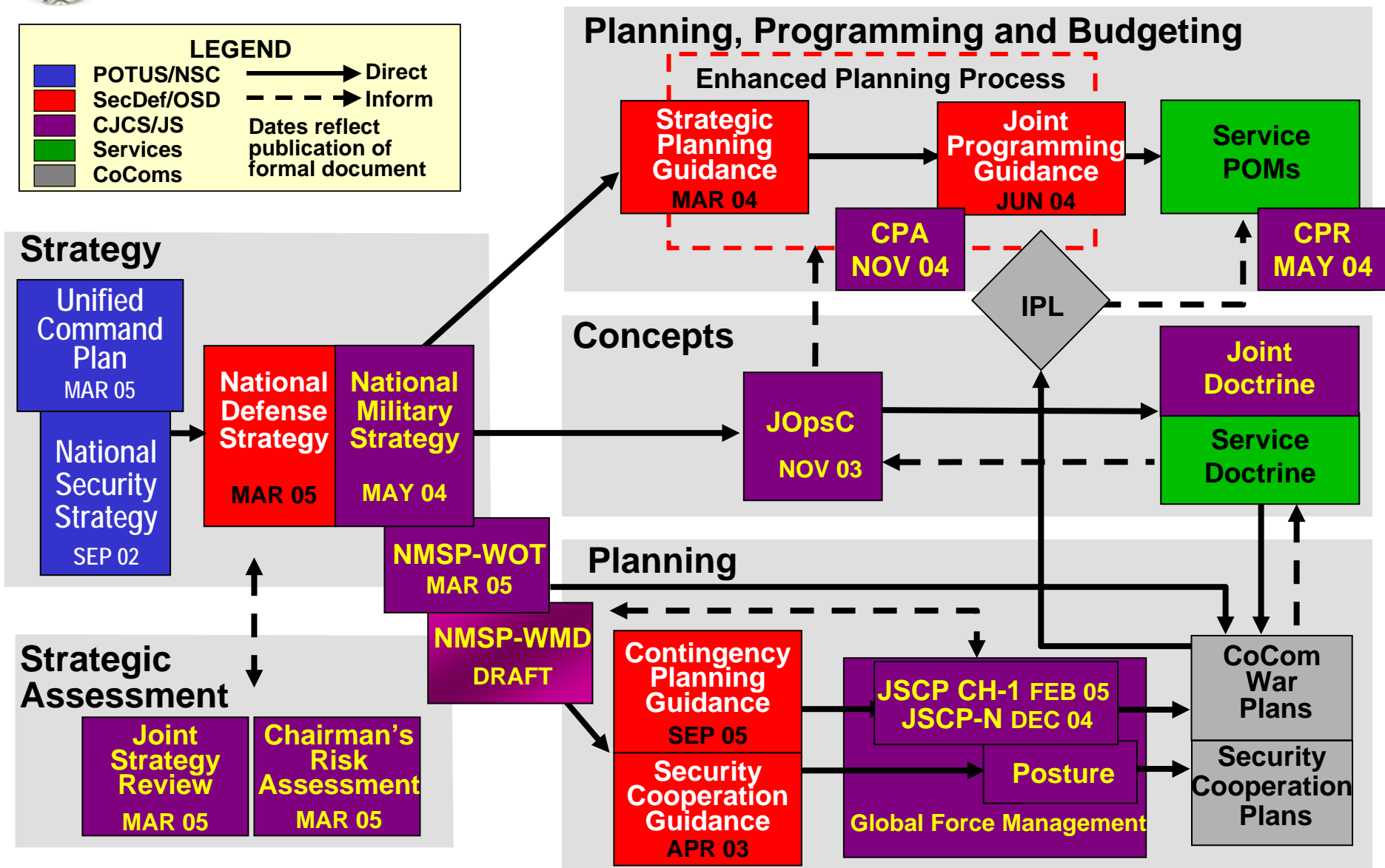
Adjustments in Strategy ?



Discussion



Strategy: Foundation for all Major Processes





Executing the Strategy: Secure the U.S.

NSS
Strategic Aim
Help Make the world not just safer, but better

Goals
Political and Economic Freedom
Peaceful Relations with other States
Respect for Human Dignity

Defense Strategy

<u>Strategic Objective</u>	<u>Sizing Constraints</u>
Secure the United States	<ul style="list-style-type: none">• 1- Defend the Homeland• 4 – Operate in and from 4 Forward Regions• 2 – Swiftly Defeat Adversaries in Overlapping Campaigns• 1 – Win Decisive Campaign to Achieve Enduring Result• Limited Lesser Contingencies
<u>Key Activities</u>	
Assure Dissuade Deter Defeat	

Military Objectives

Protect the United States

JOCs

Military Tasks

- Counter threats close to their source
- **Protecting strategic approaches**
- **Defensive actions at home**
- **Support to civil authorities and consequence management**
- Creating a global anti-terrorism environment

Prevent Conflict and Surprise Attack

JOCs

- Forward posture and presence
- **Promote security**
- **Deterring aggression**
- **Prevent surprise attacks**
- **Eliminate safe havens**
- **Preempt in self-defense**

Prevail Against Adversaries

JOCs

- Battlespace Preparation
- **Swiftly Defeat Adversaries in Overlapping Campaigns**
- **Win Decisively to Achieve More Enduring Results**
- **Conduct Post-conflict Stability and Reconstruction Operations**

Six Decades of Guided Munitions

Barry D. Watts

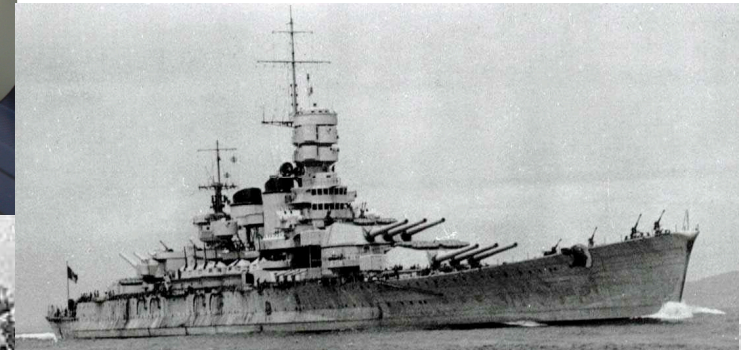
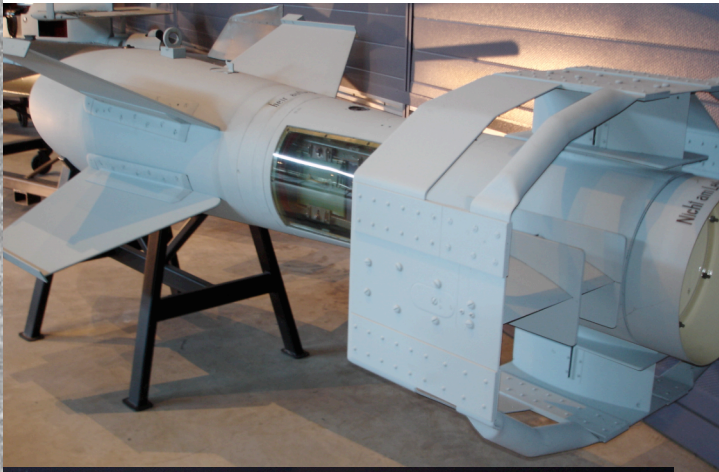
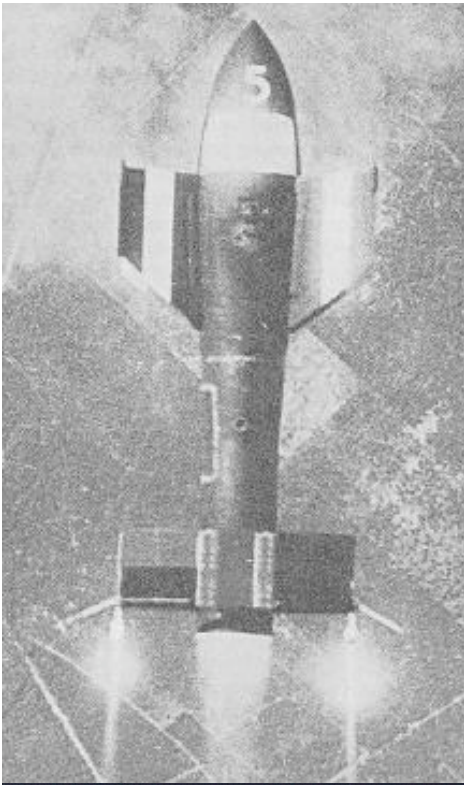
**Precision Strike Association
25 January 2006**

Fritz X (PC 1400 FX)

Radio/wire-controlled German glide bomb

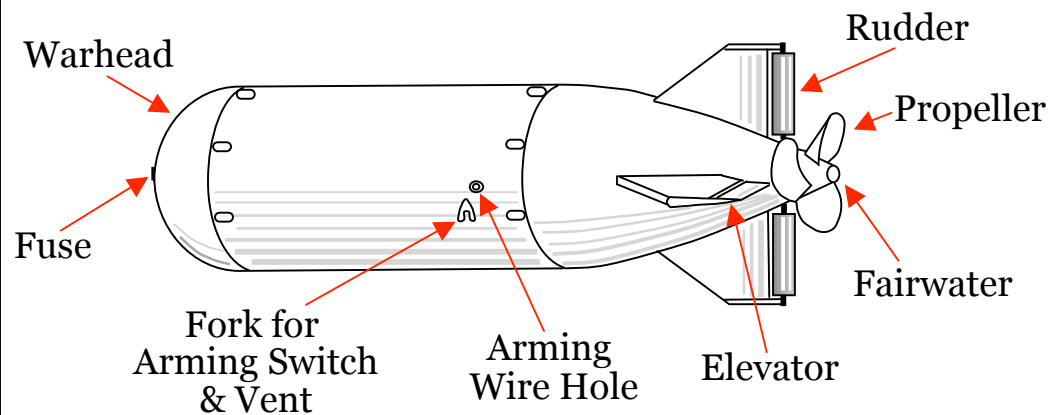
Length: 11.2 feet
Weight Loaded: 3,454 lbs
Warhead Weight: 705 lbs

In September 1943, Do 217 aircraft sunk the Italian battleship *Roma* with 2 Fritz Xs.





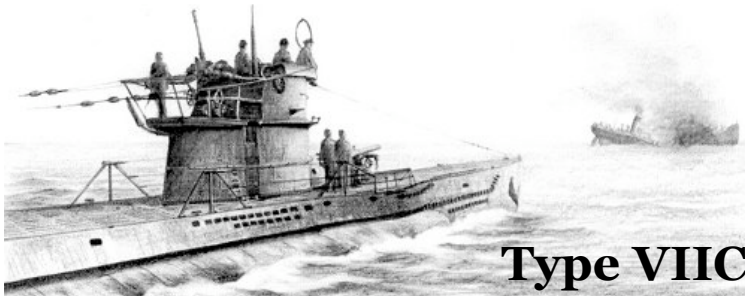
FIDO MARK 24 “MINE”



A PBY-5A sunk
U-640 on 14 May
1943—believed to be
the first sinking by a
Mark-24 torpedo

Credited with sinking
37 enemy submarines
& damaging **18** others

Length: 7 ft
Weight: 680 lbs
Warhead: 92 lbs Torpex
Guidance: Acoustic
Range: 4,000 yards
Speed: 12 knots



Type VIIC German U-boat



Ruhrstahl X-4

German air-to-air missile

Wire-guided via joystick with
acoustic fuse (B-17 engines)





AIM-7E Southeast Asia

USAF Photo

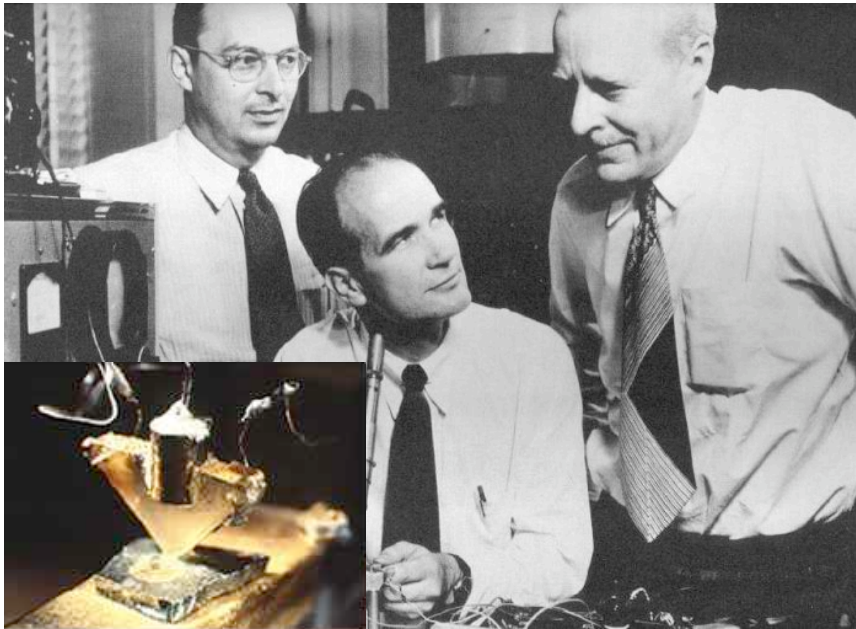
AIM-7D, 7E, 7E-2: Combat Results in Vietnam 1965-73



AIM-7E-2

Firing attempts: 612
Hits: 97 (15.8%)
Kills: 56 (9.2%)*
BVR Kills: 2

** Project Red Baron III, Vol. 1,
Executive Summary, p. 18.*



**John Bardeen, William Shockley,
Walter Brattain, Bell Labs, 1947**



The Nobel Prize in Physics 1956

“for their researches on semiconductors and their
discovery of the transistor effect”

The Integrated Circuit, 1958-59

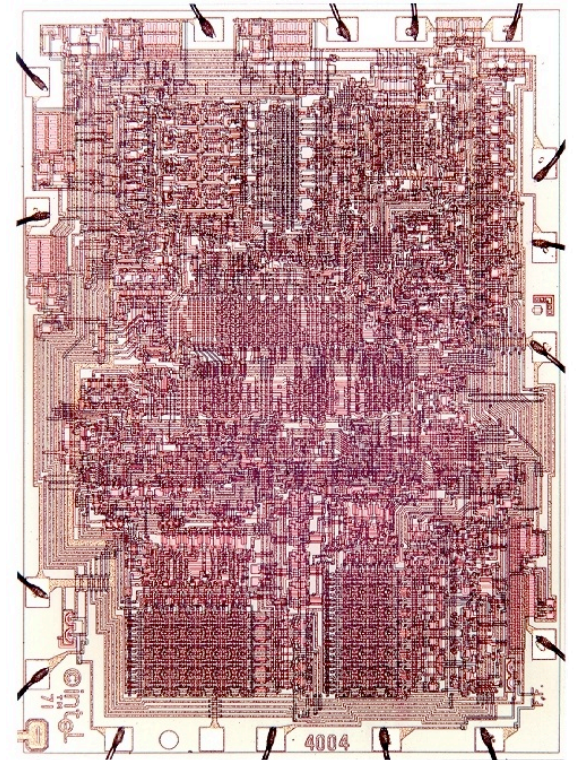
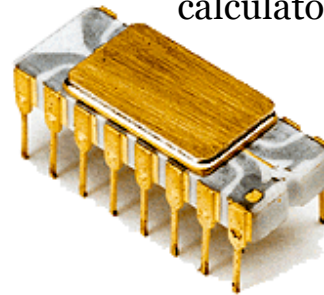
Invented independently by
Jack Kilby (Texas Instruments) &
Robert Noyce (Fairchild Semiconductors)

Kilby shared 1/2 the 2000 **Nobel Prize** in physics
“for his part in the invention of the integrated circuit”

Intel’s 4004 Microprocessor, 1971

Invented by **Federico
Faggin, Ted Hoff, &
Stan Mazor**

A 4-bit, 740 KHz, CPU
designed for “embedded
applications” such as
calculators



AIM-7M



AIM-7F (Production 1975-81)



AIM-7M *Decisive Engagement* Results in Operation Desert Storm, 1991

Firing attempts: **44***

Hits: **30 (68.2%)**

Kills: **24/26 (54.5%/59.1%)**

Initial BVR Shots: **19 (43%)**

** Omits 44 "expenditures" in logistics records not in decisive engagements*



GBU-28A/B (4,700 lbs)



GBU-10 (2,081 lbs)



GBU-24/B (2,315 lbs)



GBU-16 (1,092 lbs)



GBU-27/B (2,350 lbs)

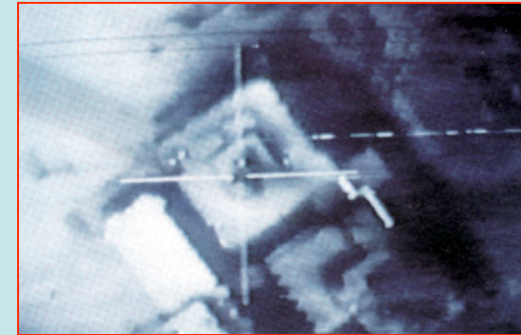


GBU-12 (611 lbs)



GBU-22/B (720 lbs)

F-117 in 1991:



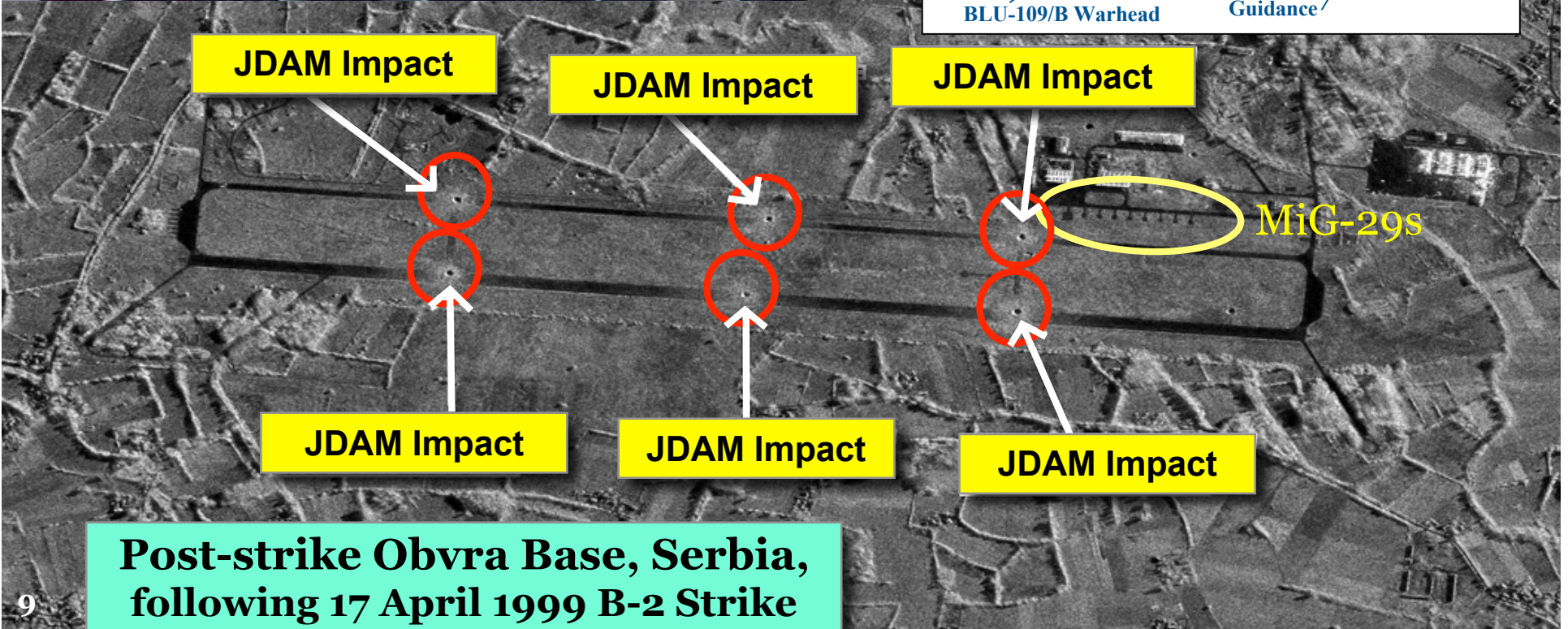
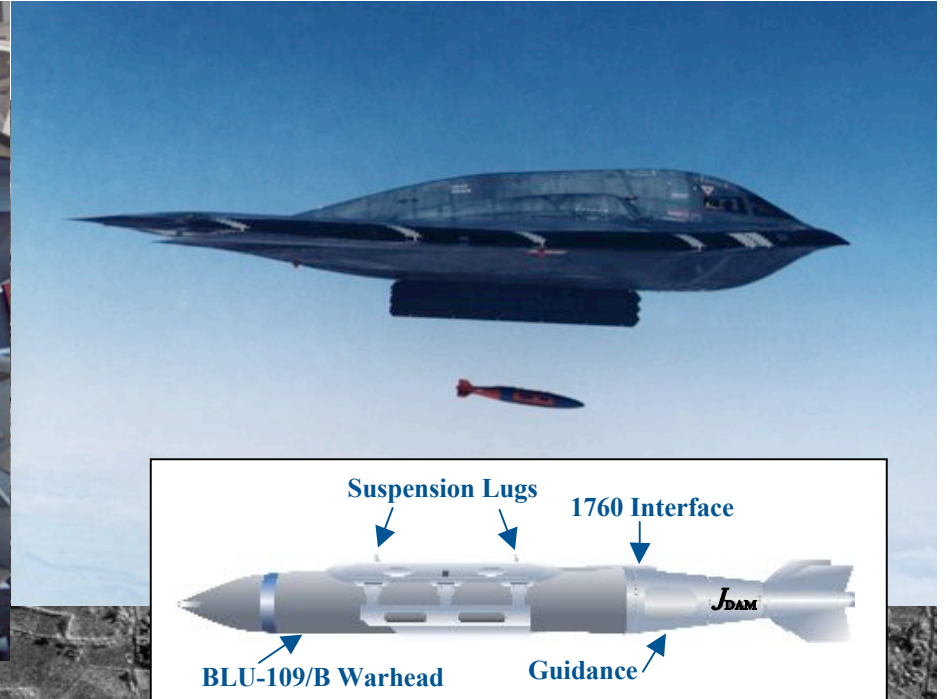
2,065 munitions dropped during 1,299 sorties

- **1,651 Hits (80% excluding no-drops)**
- **414 Misses**
- Clear-air limited

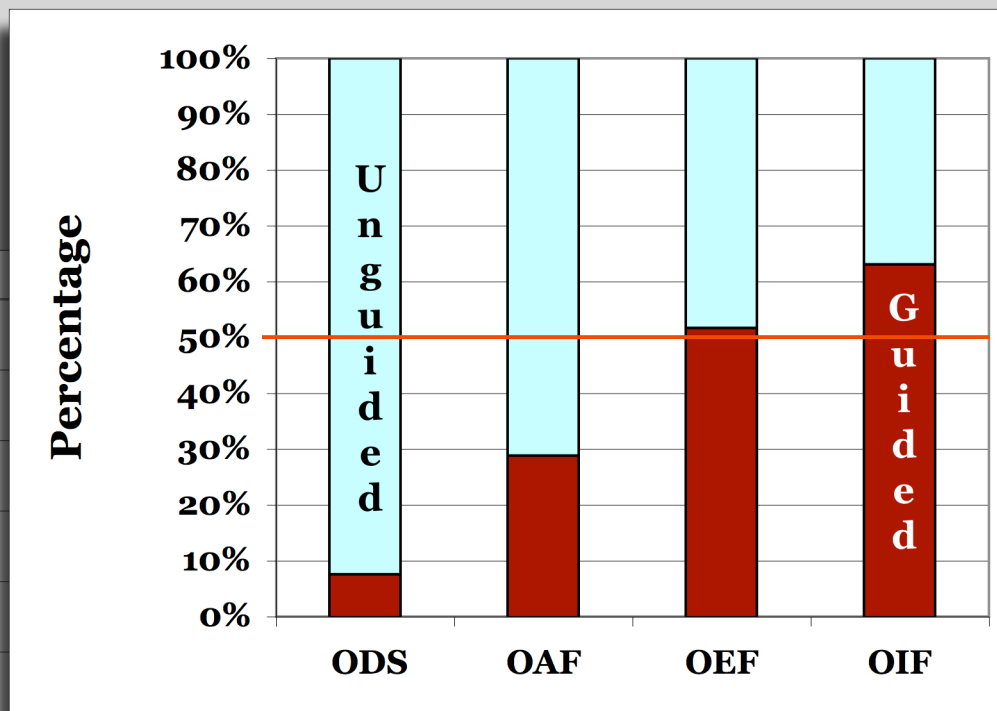
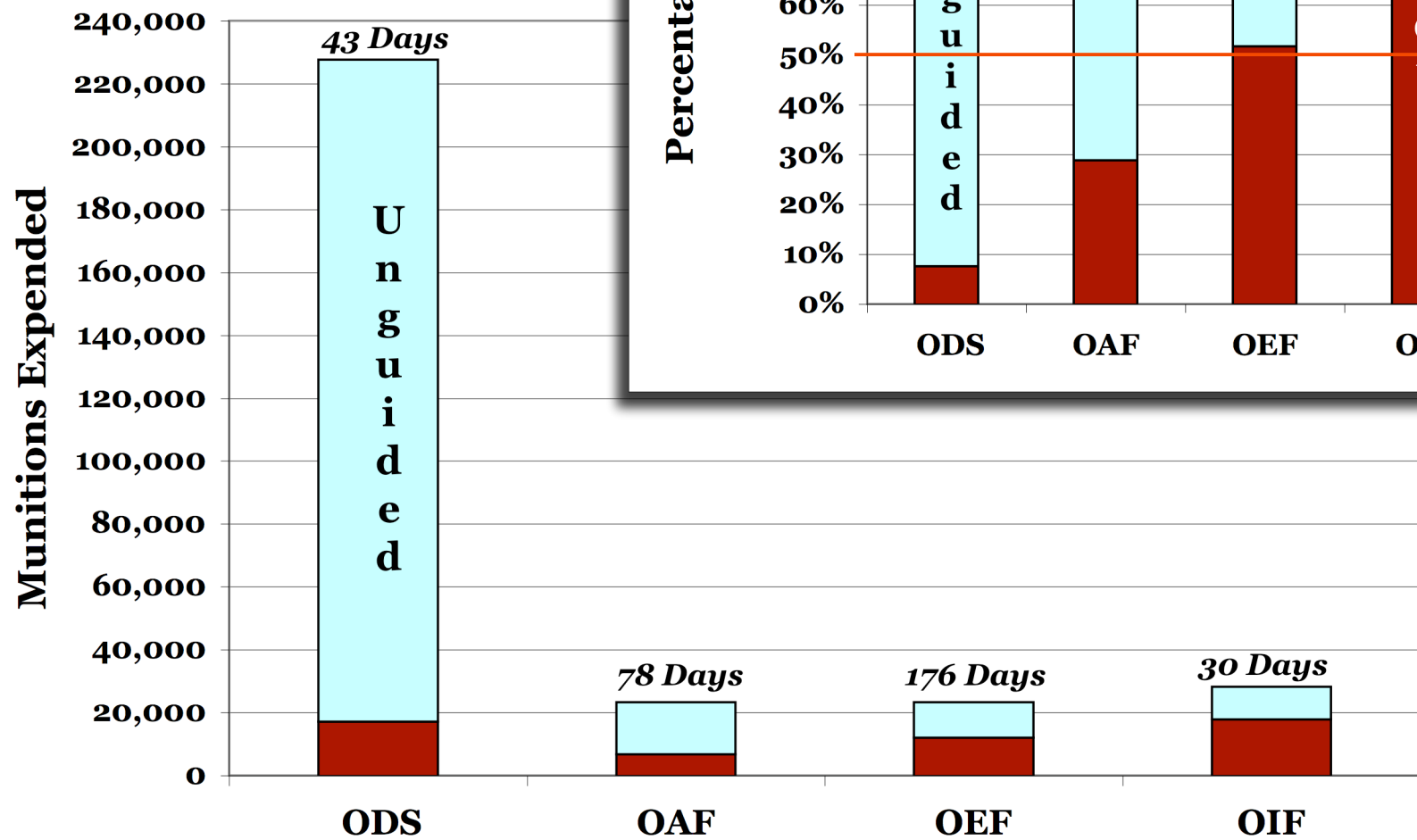
1.4 strikes/sortie versus

- 0.125-0.250 for F-111Es in Desert Storm
- 0.001 or less for B-17s in WW II

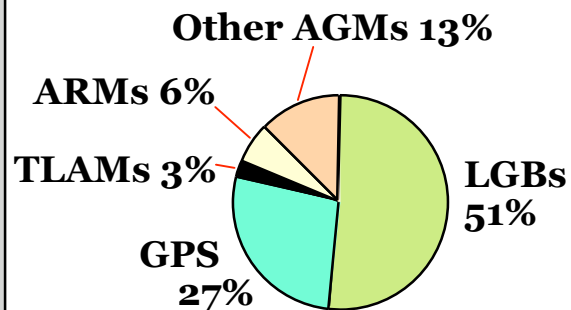




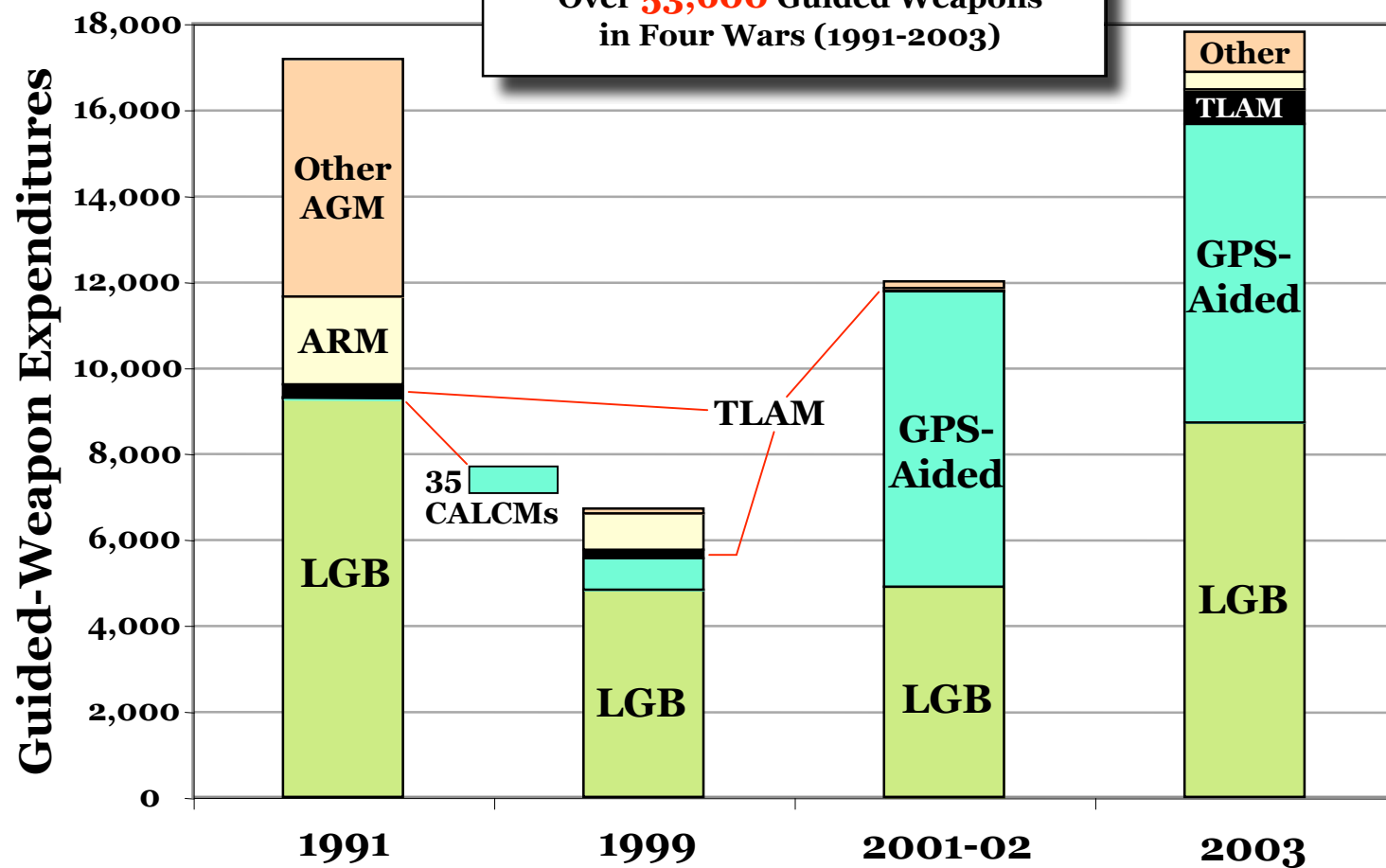




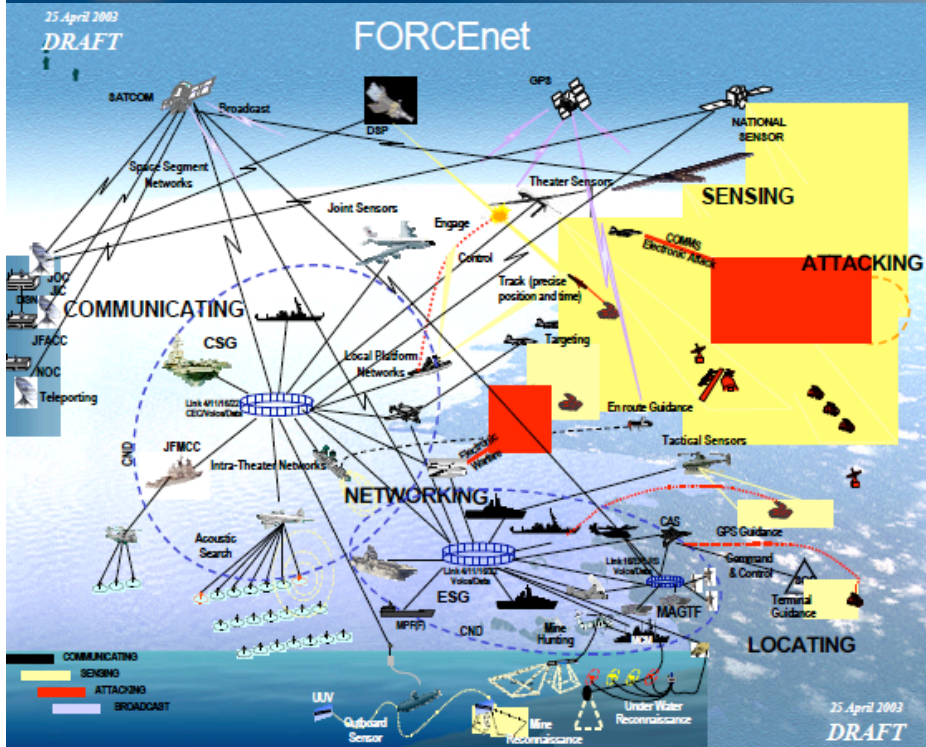
AGM = Air-to-Ground Munion (Maverick, etc.)
ARM = Anti-Radiation Missile (HARM, Shrike)
LGB = Laser-Guided Bomb
TLAM = Tomahawk Land Attack Missile
CALCM = Conventional Air Launched Cruise Missile
GPS = Global Positioning System (mostly JDAM & CALCM)



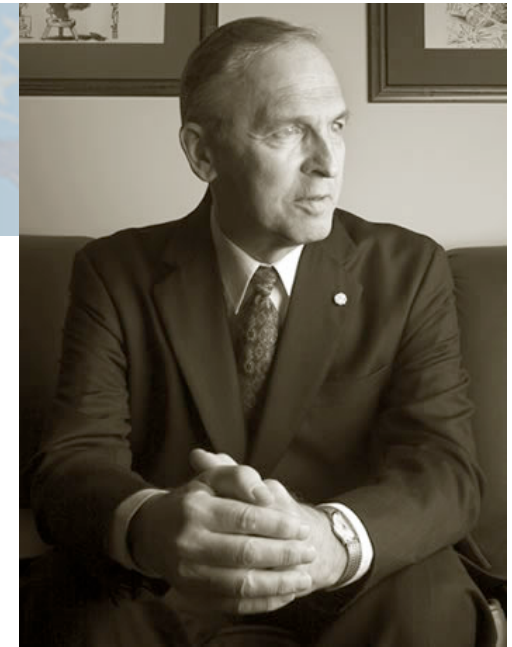
Over **53,600** Guided Weapons in Four Wars (1991-2003)



OFFICE OF FORCE TRANSFORMATION NETWORK-CENTRIC OPERATIONS



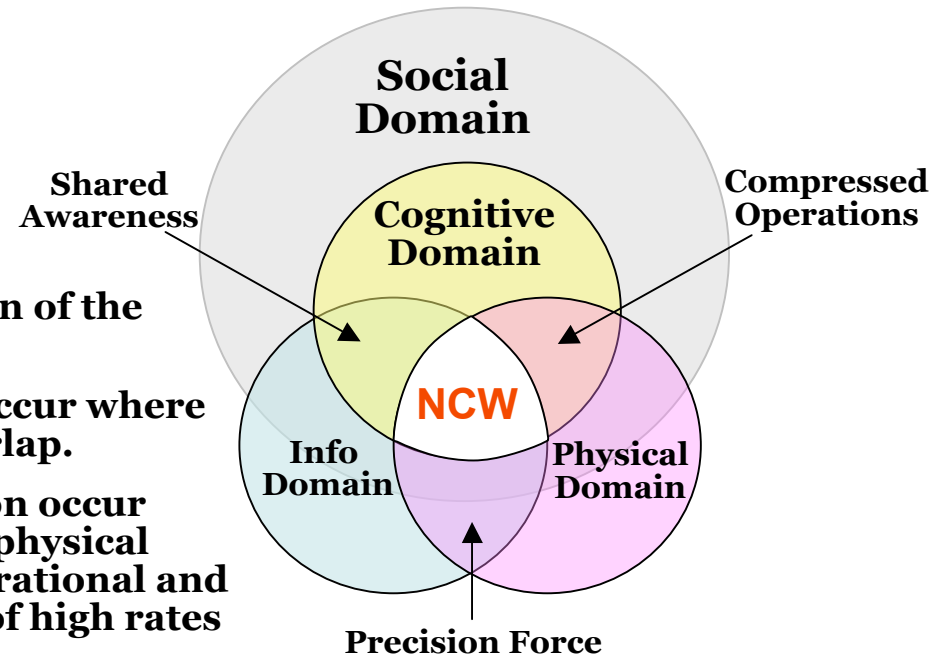
Network Centric Warfare (NCW) exists at the intersection of the social, cognitive, information & physical domains.



Precision force “is created at the intersection of the information and physical domains.”

Shared awareness and tactical innovation occur where the information and cognitive domains overlap.

Time compression and lock-out phenomenon occur within the intersection of the cognitive and physical domains, enabling tactics to give rise to operational and even strategic effects and the development of high rates of change.





***Learning Large Lessons:
The Evolving Roles of Ground Power
and Air Power
in the Post-Cold War Era***

Dr. Dave Johnson

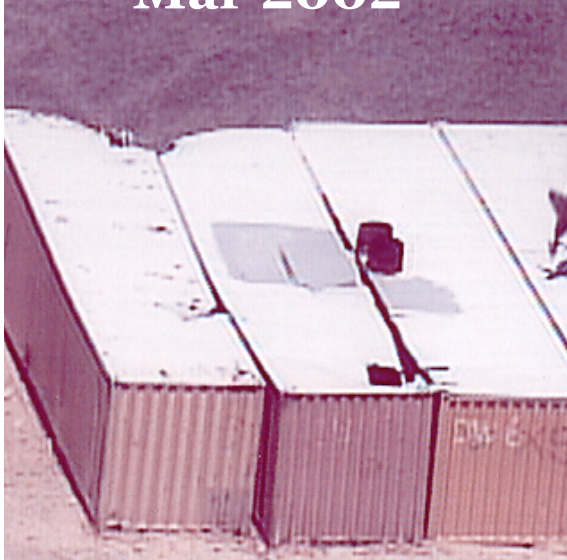
Principal Warfighting Insights

- Today's environment:
 - Fixed-winged air power, enabled by C4ISR, largely operates with impunity, setting the conditions for:
 - Air dominance of a theater
 - Effective attack of enemy fielded forces at the strategic and operational levels
 - Joint force dominant maneuver
 - Ground power, enabled by air dominance is:
 - The decisive element at the tactical level (where situational awareness is still problematic)
 - The key at the strategic level in achieving national objectives after the warfight

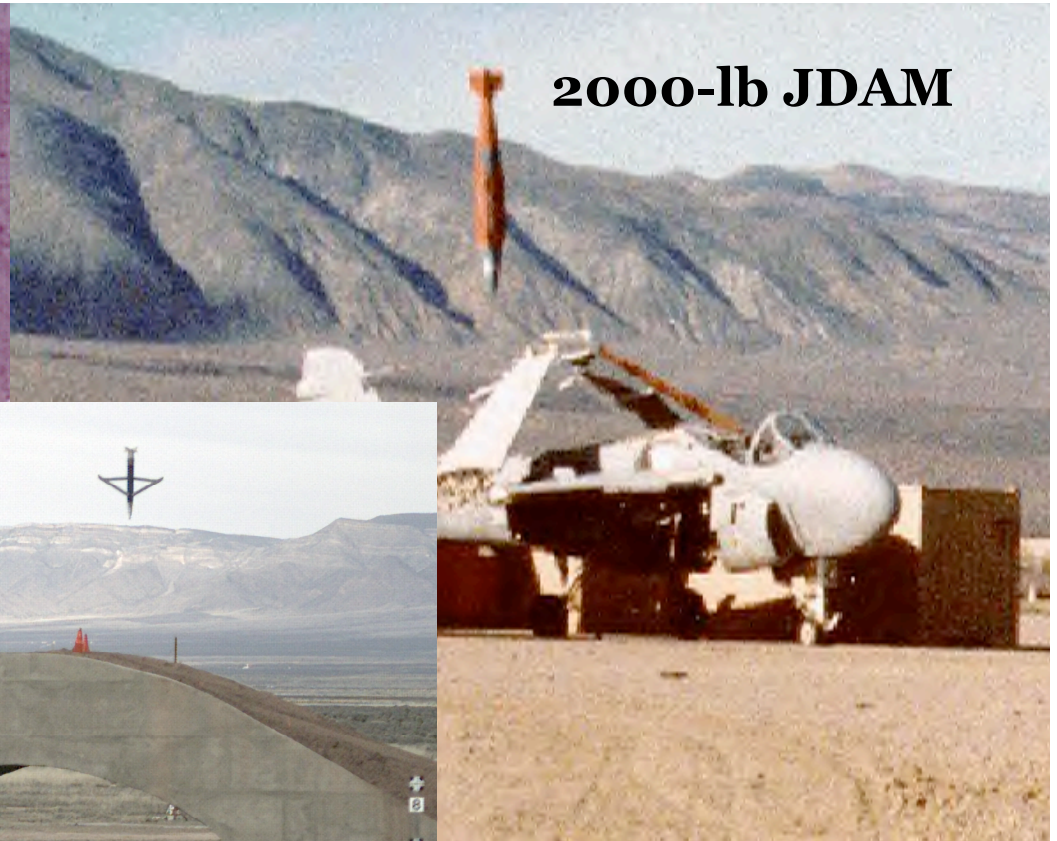
The OIF Operational Realities

- **Total Apache deep attack sorties: < 80**
- **Fixed-wing KI/CAS DMPIs struck: > 15,500**

Paveway II LGB
Mar 2002



2000-lb JDAM



SDB Sep 2005

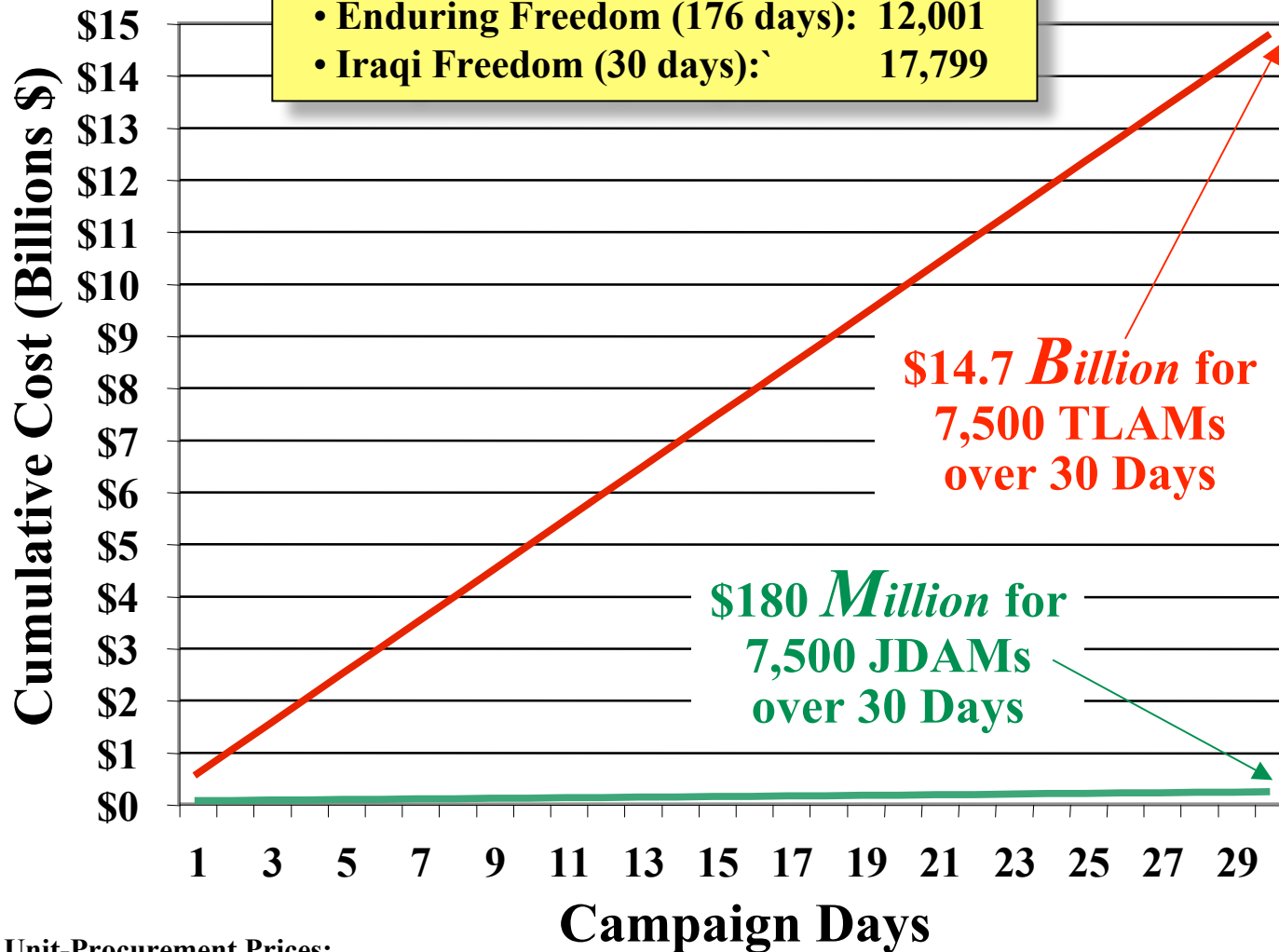


**Tomahawk Land
Attack Missile**



Guided-Weapon Totals:

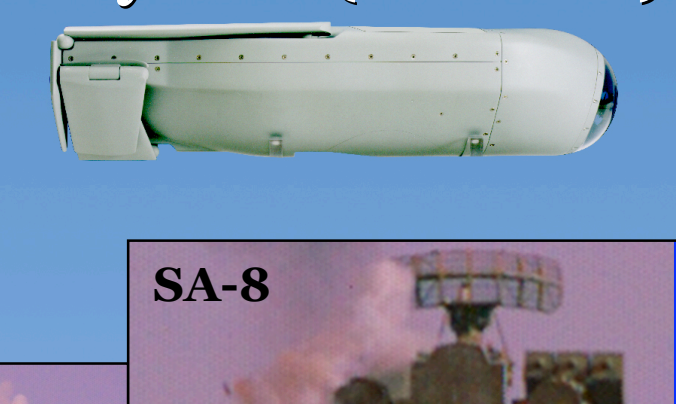
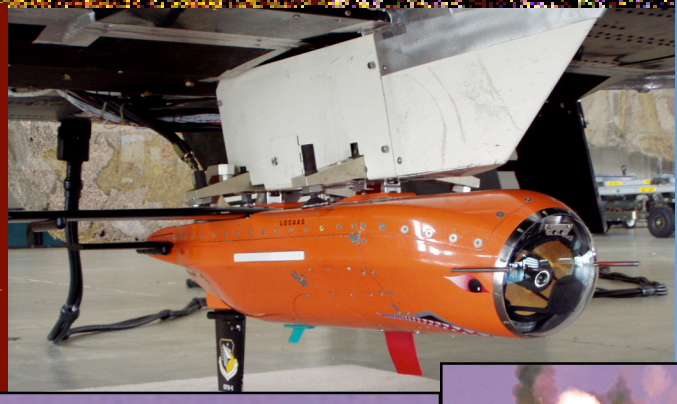
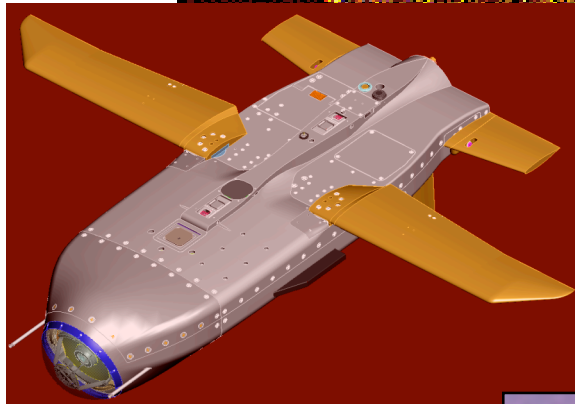
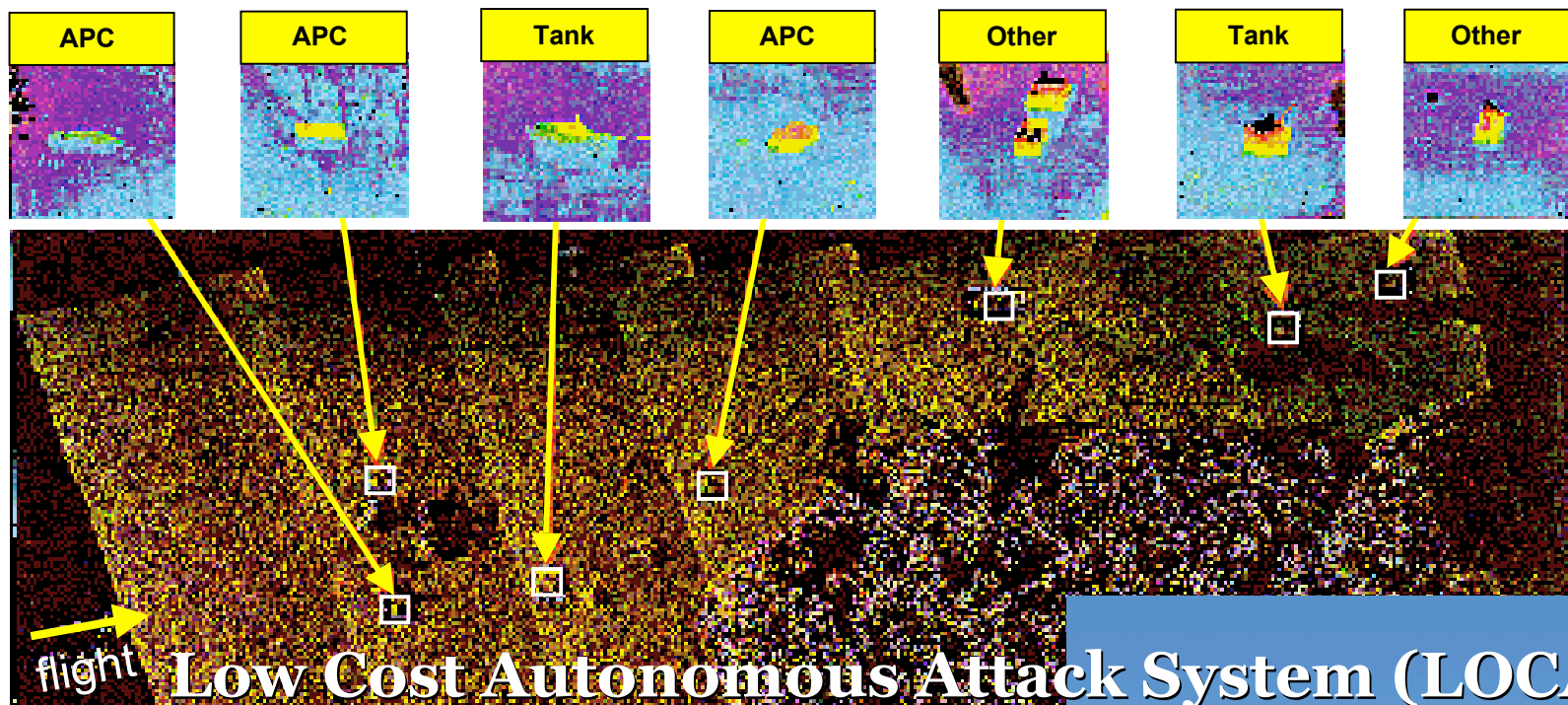
- Desert Storm (43 days): 17,162
- Allied Force (78 days): 6,708
- Enduring Freedom (176 days): 12,001
- Iraqi Freedom (30 days): 17,799



Unit-Procurement Prices:

- Tomahawk: \$1.965 million
- JDAM (Mk-84): \$23,938

— JDAM (250/Day) — TLAM (250/Day)



Conclusions

- **Long Gestation: 6 Decades & Counting**
- **Variable Acceptance (Early Adopters vs Skeptics)**
- **U.S. Trends:**
 - Movement toward **mostly** precision campaigns
 - Robust **guidance mix** (laser, GPS, etc.)
 - Increasingly robust sensor & targeting **networks**
- **Nuclear Caveats**
- **Past Thresholds (“revolutionary”):**
 - LGBs
 - Solid-state electronics
 - TLAM + LGBs: **accuracy independent of range**
 - OIF: a **changed relationship between air & ground**
- **Future Thresholds**
 - Precision attack of **imprecisely located DMPIs (LOCAAS)**
 - **Long-range & accuracy independent of cost**

Conclusions of a 2001 DSB

Defense Science Board Task Force

on

HIGH ENERGY LASER WEAPON SYSTEM APPLICATIONS



June 2001

Office of the Under Secretary of Defense
For Acquisition, Technology, and Logistics
Washington, D.C. 20301-3140

- High-energy laser (HEL) technologies have matured enough for fielding on aircraft, space vehicles, ships & ground vehicles **to be “feasible over the next two decades”**
- HEL systems are an area of exploitable **U.S. technological advantage**
- HEL systems offer **speed-of-light** engagement of a variety of targets with a range of **precisely controlled effects** & low-cost-per-shot

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